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Harlow H. Curtice

PRESIDENT

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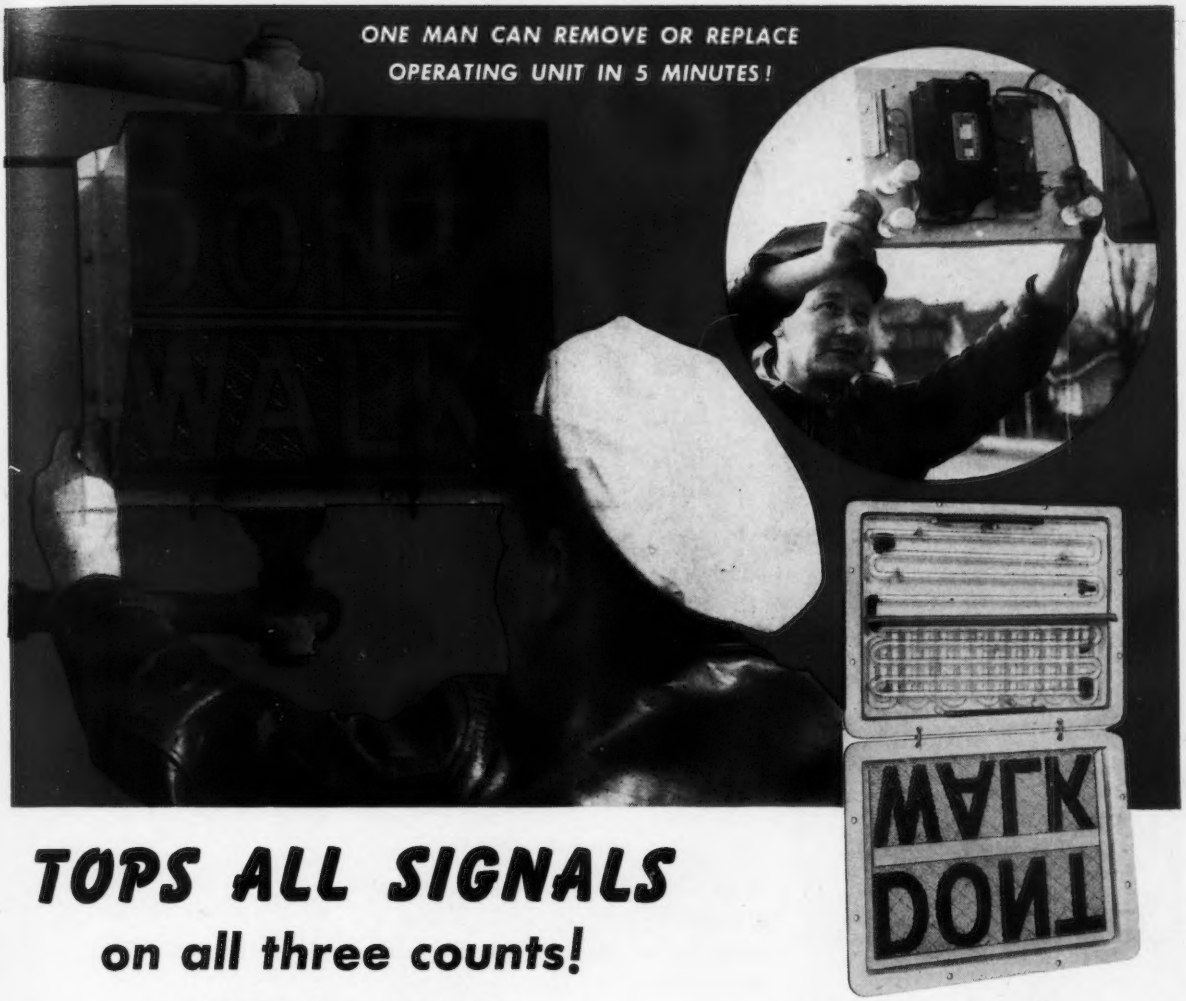

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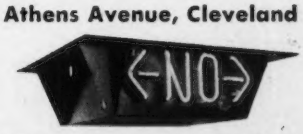

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TRAFFIC ENGINEERING

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COVER: Pedestrian scramble at downtown intersection in Los Angeles.
—City of Los Angeles photograph

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Frankly Speaking . . .

TRAFFIC PROBLEMS related to vehicular and pedestrian movement have been successfully resolved through the constant efforts of traffic engineers; improvements in facilities for moving people have been obtained by work which was performed with mass transportation companies; and the flow of persons and goods has been expedited through co-operation with truckers, taxicab operators, and various other transportation agencies.

The time and effort spent to improve traffic flow has in many instances been composed of separate, independent attempts to correct specific situations. True, any change that resulted in the improvement of certain conditions relieved congestion for all transportation services; but full recognition must be given to the fact that future planning will be inadequate unless it provides for the co-ordination of all transportation movements.

Recent service interruptions in mass transportation service in several large cities demonstrated that traffic facilities are operating on a marginal basis. A relatively small increase in the volume of vehicular traffic may cause a breakdown in normal movement that will delay travel to a much greater degree than the percentage change in volume.

Comprehensive plans incorporating all transportation requirements are needed. Traffic engineers must be able to use existing streets most efficiently. They must have information that will enable them to link urban street patterns with state and Federal road systems.

Cooperation with all planning agencies constitutes a basic factor for obtaining the greatest advantages from future improvements. In order to derive substantial benefits from planning work, traffic engineers must be prepared to contribute factual information.

Federal, state, and municipal administrations recognize that studies involving only vehicular movements are inadequate for future use. Continuous studies of all trips involving the movement of people and goods are necessary in order to deal with the overall problem. By studying trends it will be possible to advise on the practicability of building expressways with private right-of-way for rapid transit lines or loading facilities for express bus operation; the feasibility of appropriating funds to separate mass transit lines from vehicular traffic by means of subways or monorail systems can be evaluated; it will be possible to determine whether demand for mass transportation justifies use of exclusive transit lanes or transit streets; complete data will aid in determining the locations and capacities of terminals for buses, air-lines limousines, trucking operations, taxicabs and heliocopters. Funds are available, and co-operation in obtaining information can be expected.

The important prerequisite left unfilled is that someone must take the bold initiative to request and ascertain that necessary studies be undertaken. This job will have to be assumed by traffic engineers. Co-operation with others can be effective only if we can supply that information for which we are responsible.

MICHAEL J. GITTENS
Director, District 2
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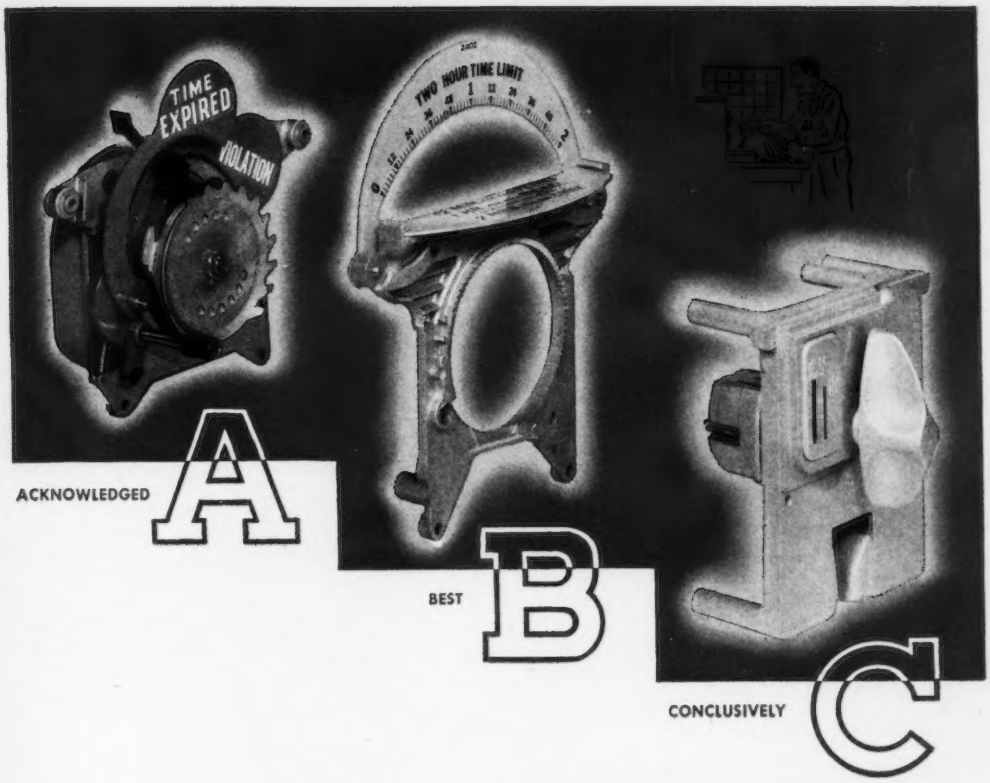

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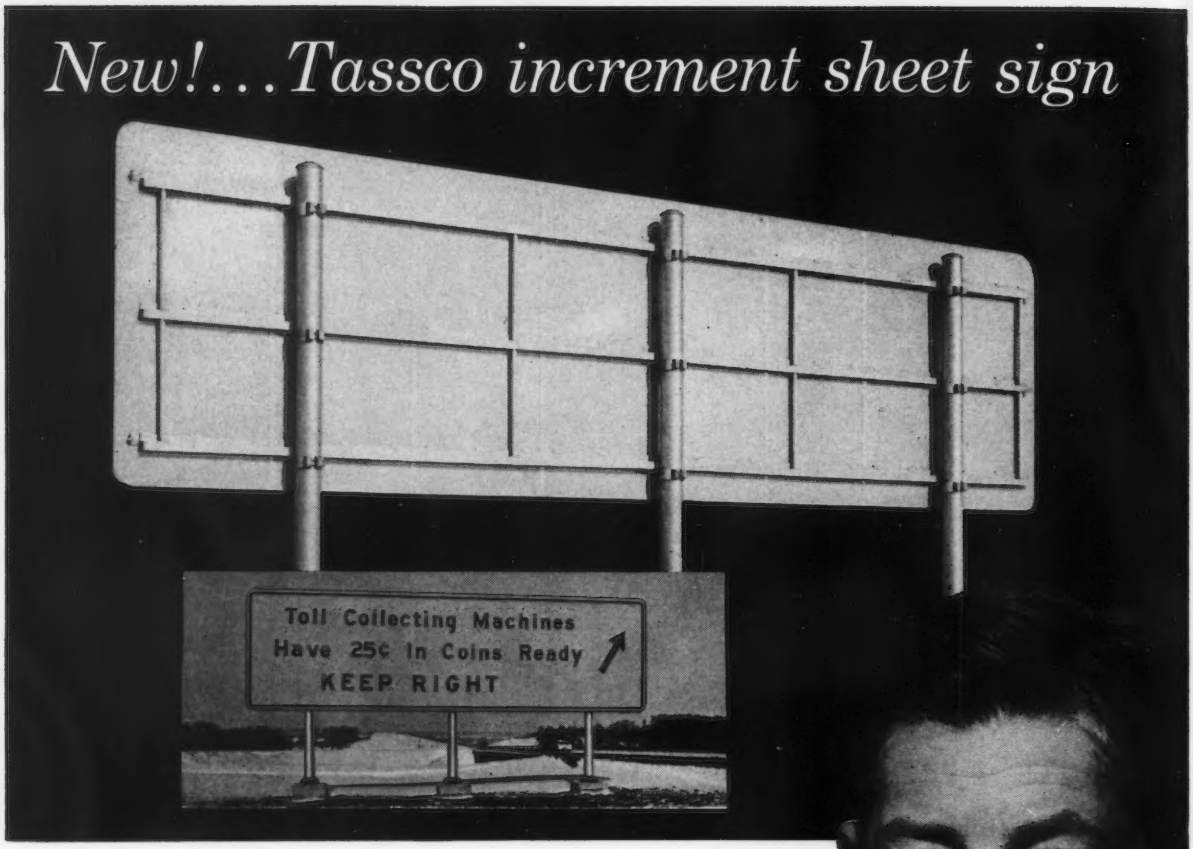

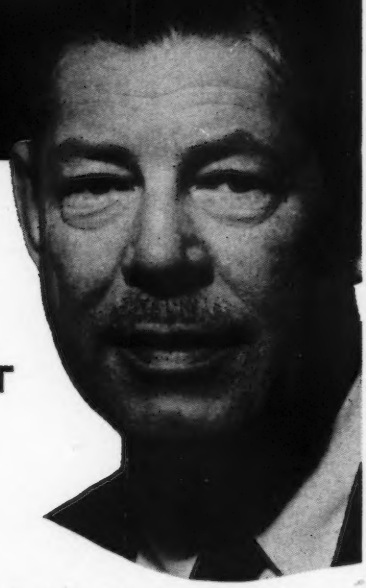

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Some Guides in the Selection of Freeway Interchanges

by Paul R. Tutt
(Jun. Mem., ITE)
Senior Designing Engineer
Texas Highway Department

THE CROSSING OF two freeway type facilities inevitably involves an extensive conglomeration of roads and bridges which to the inexperienced person looks like a completely unintelligible mass of loops and ramps. A closer look at a typical intersection such as the one shown in Figure 1 will show, however, that a driver entering such an intersection uses only a small part of the facilities provided and has only two points at which he has a choice of more than one possible path. At point A he must decide whether or not he wants to continue ahead on the road he is on or turn off to the intersecting road. If he elects to go ahead, he has no more decisions because there are no more possible turns for him to make. If he elects to turn off at point A, he then has a choice at point B of whether to go to the right or to the left. Either way he has no additional choices beyond point B. These two decisions are relatively simple if the points are properly signed, and the intersection should not be much of a problem for the driver. This general arrangement is true of nearly all properly designed and adequately signed intersections.

In determining what design to use at any particular location the designer must base his decision on the demands of the traffic to be served. Volume is of prime importance but speed and general characteristics must also be considered. General characteristics include such things as the per cent of trucks, per cent of repeat drivers, and the type of facility which the traffic has become accustomed to before approaching this particular intersection.

One of the most common types of intersection used in freeway design is the ramp or diamond as shown in Figure 2. It is used primarily at locations where a freeway crosses a lesser facility, however, and will not be dealt with extensively in this discussion. The procedure suggested here for determining the adequacy of a design can be applied to a ramp type design, however.

Several basic features enter into the selection of the design for a freeway intersection. These features or component parts, each of which has definite characteristics of its own, can be combined in properly assembled groups to make up the intersection. These parts are such things as lanes, roadways, loops, bridges and weaving sections. The capacities of such parts as loops and weaving sections are likely to be the features which control the design. The capacity of a bridge is variable since it is possible to make the bridge as wide and as long as necessary to span and carry the required number of lanes. If no traffic desired to turn from one road to another, the bridge in itself would be all the intersection needed. This is an important point because there are a few instances where turns form a very small part of the traffic volume or where they can be forced to turn at another location.

When turns constitute a considerable part of the traffic volume, however, as is usually the case, a more elaborate arrangement is needed. Right turns, since they do not conflict with other traffic movements, are not usually a problem. The only requirement for right turns, as shown in black in Figure 3, is that the capacity of the lane or lanes be great enough and that the capacity of the facility going away from the intersection be great enough to absorb the combined turning and through movement. Each left turn, shown in red on Figure 3, conflicts with four other movements. The volume of these left turns and the means used to eliminate the conflicts caused by them determine the type of intersection facility.

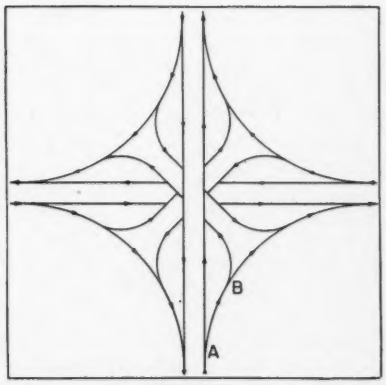

Figure 1

Four-Approach Intersections

For four-approach intersections there are several basic designs plus many variations of these basic designs which can be used. Any of these can accommodate as many straight through and right turning vehicles as it is practical to provide lanes for. Their ability to handle left turning movements varies considerably.

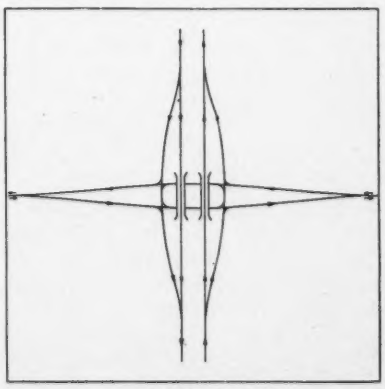
Figure 2

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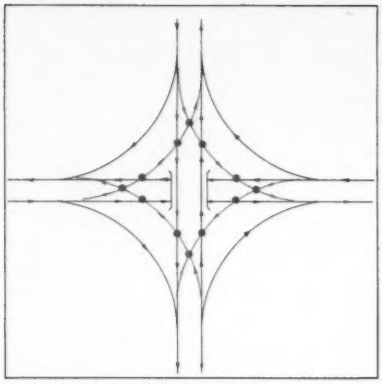


Figure 3

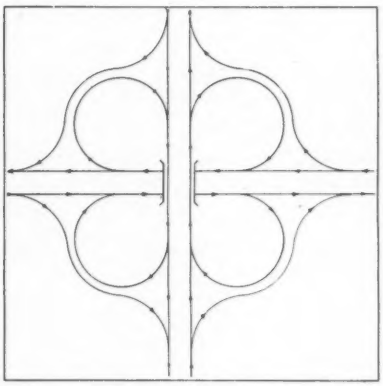


Figure 4

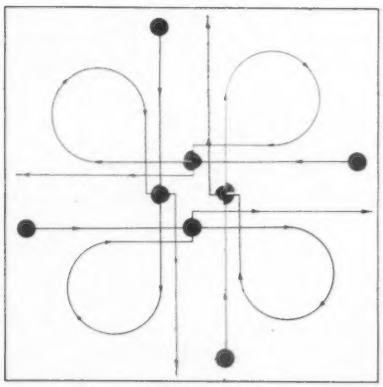


Figure 5

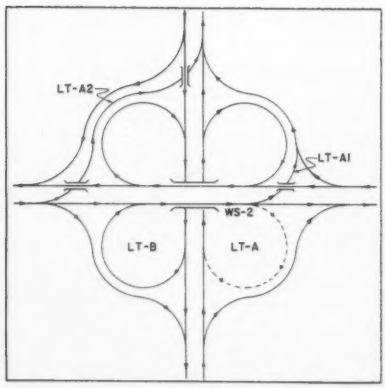


Figure 6

Figure 4 is a line diagram of a simple cloverleaf type intersection. This represents the lower limit of left turn capacity for free flowing intersections. The capacity of the through movements and the right turns can be varied by adding or subtracting lanes but the left turn capacity is limited by two factors.

(1) The volume of each individual left turn is limited to the capacity of the loop which it must traverse. The capacity of a loop is usually considered to be limited to one lane because the geometrics of the loop are such that drivers tend to form a single line regardless of the width and, of course, speeds are definitely limited. *The Policy on Geometric Design of Rural Highways*, published by the American Association of State Highway Officials in 1954, in Table II-16, Page 98, and Table VII-3, Page 263, can be used as a guide in determining what size loop should be used and what its approximate capacity will be. The general consensus of opinion among engineers, however, is that loops designed for more than about 30 or 35 M.P.H. are not practical because of the increased travel time brought about by the longer radii needed for higher design speeds.

(2) Since each left turn must weave individually through both of the left turns entering at right angles to it as illustrated in Figure 5, the combination of the two movements must not be greater than can accomplish this weaving maneuver. The weaving capacity can be determined approximately from Table VIII-3, Page 357 of the *Policy on Geometric Design of Rural Highways* mentioned previously. The weaving vehicles will, of course, be equal to the combined left turns per hour for any two adjacent approaches. If either of these two limiting conditions is exceeded, it will be necessary to alter the design. If the capacity of a loop is exceeded, it will, of course, be necessary to provide for that particular movement in some other manner. Figure 6 shows two possibilities for this. In this instance the volume of cars wishing to use the loop labeled LT-A is greater than the capacity of the loop. This movement can be then handled as shown by LT-A1 or LT-A2. Either of these treatments improves the capacity provided for this particular left turn but LT-2A provides more direct alignment.

If LT-A did not exceed the capacity of the loop, but rather the combination

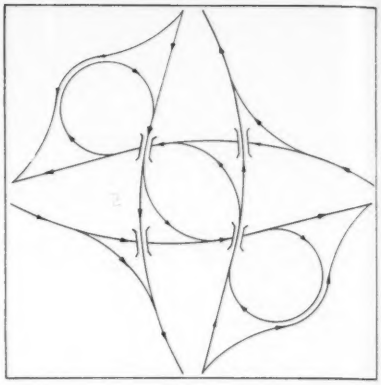
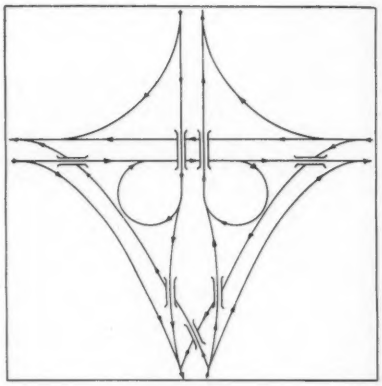


Figure 7



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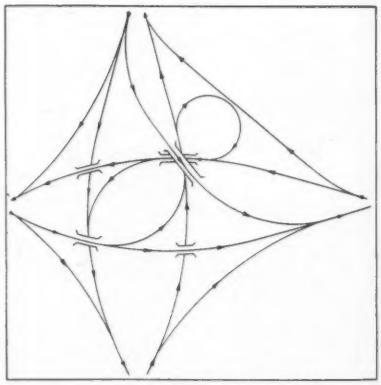

Figure 9

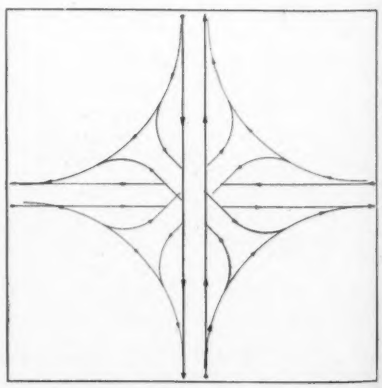

Figure 10

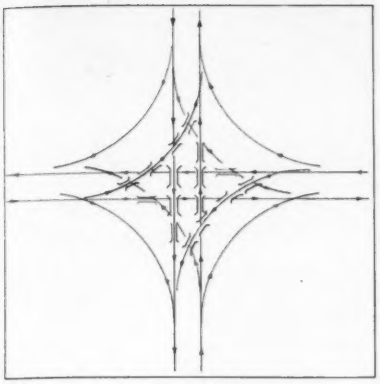

Figure 11

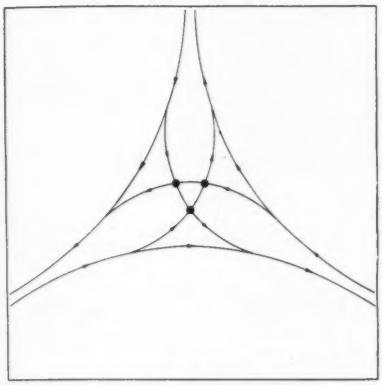

Figure 12

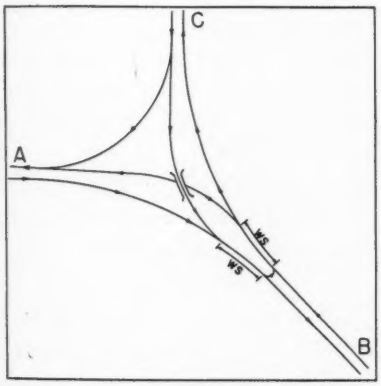

Figure 13

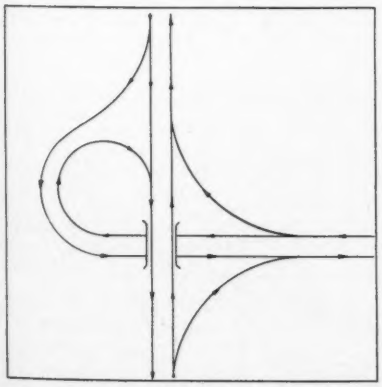

Figure 14

of LT-A and LT-B, which must weave through each other in the area indicated as WS-2, exceeds the capacity of the weaving section, the solution might be the same as suggested when the capacity of the loop was not great enough to accommodate LT-A. By moving LT-A to LT-A1 or LT-A2 the weaving section is eliminated completely. In this case the treatment could be applied to either LT-A or LT-B since removing either of these from WS-2 eliminates weaving. The treatment would usually be used on the heavier left turn movement, but might be dependent on topography or other consideration.

In various cases the capacities of any or all of the loops and weaving sections may be exceeded, requiring special treatment for the movements involved. Several examples are shown in Figures 7, 8, and 9. These are some of the intermediate steps between the cloverleaf which provides the least facility for left turns, and the full direct interchange, which provides a direct connection for each left turning movement. The capacity of these direct connections is limited only by the alignment and number of lanes of the connection and by the capacity of the merging operation which must occur as the direct turn enters the through movement. There are two basic types of direct interchanges as illustrated in Figures 10 and 11. Figure 10 shows a four level interchange with each pair of opposing left turns carried on a separate intermediate level. It has the disadvantage of requiring a 60-foot difference in elevation between the top and bottom levels which often results in either very long or very steep grades. It has the added disadvantage that the alignment of the left turn movements is not as good as might be desired, but has the advantage that the turns merge into the through lanes from the right and into the slower right lane. Figure 11 shows the same general objective accomplished by spreading the conflicts out over a larger area and providing a number of bridges rather than the concentration shown in Figure 10. This design does not have the extreme differences in elevation as is required for the Figure 10 design and the left turns are more direct, allowing better alignment and resulting in higher operating speeds. The left turns merge into the through lanes from the left which is less desirable than if they could be brought in from the right. The designs as shown usually assume

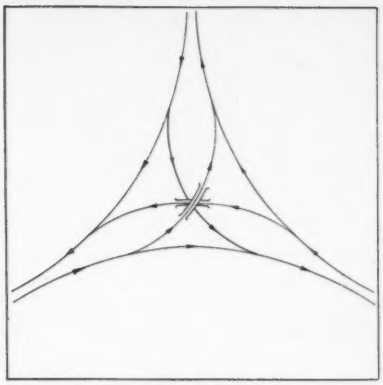

Figure 15

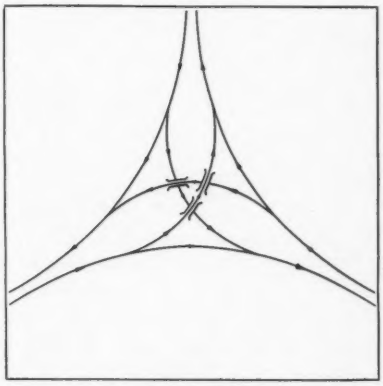

Figure 16

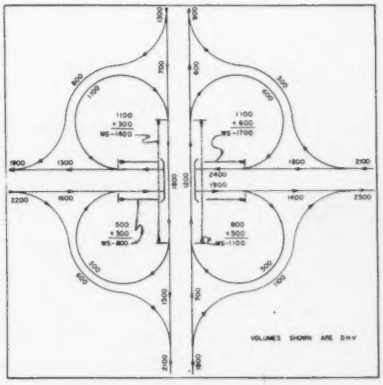

Figure 17

level terrain. It is often possible to use terrain to considerable advantage, however, in which case it might be desirable to change some of the relative elevations.

Three-Approach Intersections

The number of possibilities for three-approach intersections is considerably less than it is for four and the approaching driver has only one point at which he must choose between one of two possible routes. Figure 12 shows the movements for a three-approach location diagrammatically with the three

points of conflict indicated. These three points of conflict can be dealt with in several ways, two of which are shown in Figures 13 and 14. Figure 13, which might be used where one of the left turns is very low in volume, accomplishes the turn from A to C by weaving it across the C-B movement, turning it on a short radius and weaving it across the B-A movement. This, of course, limits the capacity of the whole intersection by involving most of the movements in weaving. Figure 14 uses a cloverleaf type treatment, which eliminates the weaving section. Here, of course, the limiting factor is the loop itself. Either of these types, while having their limiting features, serves very well when used at locations where they are suited to the volumes. The capacities, of course, must be determined by component parts and based on the AASHO policy tables mentioned previously.

The direct interchange for a three-approach location may take the form of a three level interchange as shown in Figure 15, or may have the bridges decentralized, so to speak, as shown in Figure 16. The capacity of these types would be limited only by the number of lanes provided and could be increased by increasing the number of lanes.

In addition to using these criteria, the selection of the type of intersection for a given location requires considerable judgment. The first step of course, is to obtain the traffic volumes. The DHV or 30th highest hour for 1975 should be used and can be obtained from the Highway Planning Survey. These should be broken down by the Planning Survey so as to show each turning movement separately.

Inspection of the figures should make it possible to select a tentative design. The DHV traffic should then be put on the selected design and broken down completely by component parts as shown in Figure 17. Each of the component parts should then be checked against the AASHO policy tables previously mentioned. In any instances where the 1975 DHV exceeds the capacity the design should be altered so that the needed capacity is provided. It should be kept in mind that this procedure will usually result in the selection of the minimum facility which will handle the traffic. There will be many cases where it will be possible and desirable on the basis of speed and

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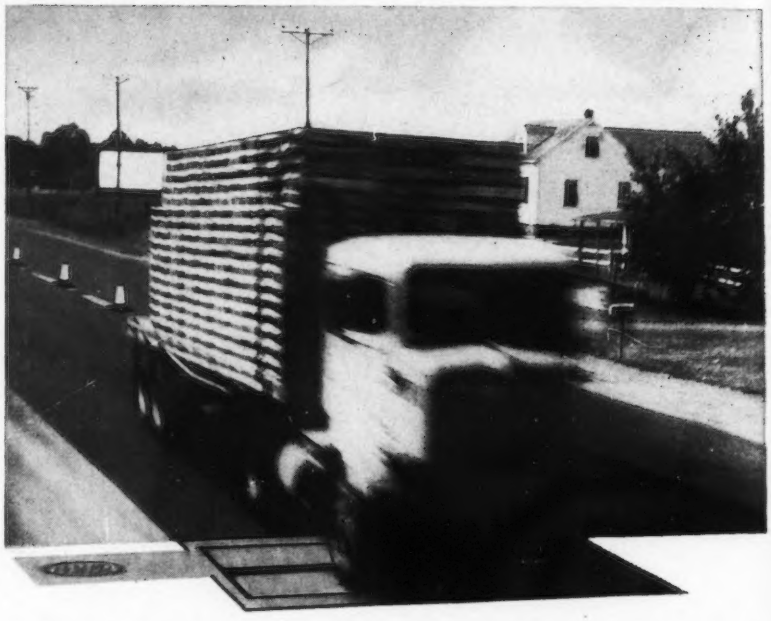

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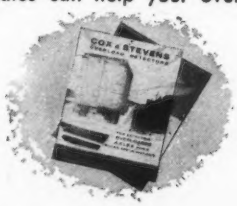

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Case History

High Capacity Through Medians And Signals

by A. L. Himelhoch
(Assoc. Mem., ITE)
Assistant District Engineer
California Division of Highways

THE RAPID industrial growth around the Los Angeles International Airport is generating an increasing amount of commuter traffic to and from the area. Streets and highways feeding the area are, therefore, becoming more and more congested. Leading south from the airport is only one major through highway, US 101 Alternate. As a result, extremely heavy peak traffic volumes have developed on this route. Congestion and delay increased to a point where some type of improvement was essential. The highway was a four-lane, undivided road, with considerable roadside business throughout. The expense of additional right-of-way for widening was not considered economically feasible, particularly in view of ultimate freeway development in three or four years.

The plan, therefore, was for improvement within existing curbs. The improvement consisted of:

1. The installation of additional traffic signal controls to allow cross traffic through the barrier created by heavy traffic flow on US 101A.

2. The conversion of existing traffic signals to three-way operation because of very heavy left-turn volumes.

3. The supervision of all traffic signals within this system by a traffic-controlled variable cycle and preferential master electronic computer to provide maximum traffic-handling ability, automatically adapting to favor the heavier direction.

4. The construction of a curbed median divider throughout the system providing left-turn lanes to reduce accidents and to allow smooth and efficient traffic flow.

The project was completed this year at a cost of $185,400. After testing and adjustments, the results of the observation of operation and traffic-handling ability were outstanding. With hourly volumes up to 1,500 vehicles per lane and 780 left turns, the system proves that traffic engineering can alleviate many surface street congestion problems heretofore thought insolvable.

The morning and evening rush-hour traffic congestion on our highways is a constant and ever-increasing problem in metropolitan areas throughout the country. Mr. John Q. Public is constantly applying pressure on the traffic engineer to eliminate "bottlenecks" and congestion on the route to and from his place of employment. He is always in a rush to get to work and in a bigger rush to get home. Delays are aggravating. He is a member of a large group of commuters comprising nearly 50 per cent of the total traffic using many metropolitan area highways on any working day. In driving with the peak traffic or on the crest of the wave, he receives the impression that the congestion period is nearly endless, when actually at any given point on his route it will last only for about an hour, morning and evening.

This of course, is the hour of congestion that we would all like to see eliminated.

In the Greater Los Angeles metropolitan area there are many arterial highways leading to and from commercial and industrial areas that are becoming increasingly congested during the morning and evening peak "rush hours." Freeways are being built as rapidly as possible to alleviate these congested surface streets. However, many existing highways require immediate improvement because of very rapid increase in traffic volumes and congestion.

Industrial Development

The southwestern section of the Los Angeles metropolitan area has grown and developed in the past few years at a rate exceeded only by very few areas in the country. This has been mainly due to an aircraft industrial development, growing around Los Angeles International Airport. Two of the many plants in the area presently employ about 45,000 people. In addition, an estimated 35,000 passengers per day will use the expanded airport facilities in the near future. Many other plants in the immediate area employ thousands more. As a result, highways leading to and from the area are presently heavily overloaded during the peak "rush hours."

U.S. Sign Route 101 Alternate, Sepulveda Boulevard, is the only major highway leading from the airport area to the beaches and coastal areas to the south (Figure 1). This route is the major north-south coastal highway along the Pacific Coast, serving coastwise through traffic. In addition, State Sign Route 7 merges from the north into U.S. 101 Alternate at the airport, feeding traffic from the San Fernando Valley and western sections of Los Angeles.

The peak load of relatively local commuter traffic is therefore superimposed onto the normal through coastwise commercial and recreational traffic, creating an extremely heavy and prolonged traffic "rush hour."

Cross-Traffic Barrier

As there are no through parallel north-south routes close enough to be used as alternate routes, this heavy stream of traffic flows south on Sepulveda Boulevard through the residential beach city of Manhattan Beach. This resulted in extreme congestion along the route and, in addition, a barrier to the local beach area cross traffic that was nearly impassable. As the freeway planned to relieve this route will not be completed for several years, an im-

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DOWNTOWN
LOS ANGELES
AREA
PROJECT
LOCATION
PACIFIC OCEAN
LOS ANGELES
SANTA MONICA
VENICE
BEVERLY HILLS
GLENDALE
PASADENA
SAN MARINO
S. PASADENA
ALHAMBRA
MONTEREY PARK
MONTEBELLO
VERNON
MAYWOOD
HUNTINGTON PARK
BELL
WALNUT PARK
SOUTHGATE
DOWNEY
LYNWOOD
CLEARWATER
BELL FLOWER
NORTH LONG BEACH
LAKE WOOD
COMPTON
GARDENA
CENTURY BLVD.
LENNOX
INGLEWOOD
HAWTHORNE
LOS ANGELES INTERNATIONAL AIRPORT
EL SEGUNDO
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
TORRANCE
WALTERIA
LOMITA
HARBOR CITY
PALOS VERDES ESTATES
WILMINGTON
LONG BEACH
SEAL BEACH
SUNSET BEACH
SAN PEDRO
Palos Verdes Pt
Pt Vicente
Pt Fermin
LOS ANGELES AND VICINITY
SCALE IN MILES
0 1 2 3 4 5

Figure 1

mediate improvement in the area was indicated.

The real problem existed on Sepulveda Boulevard between Rosecrans Avenue on the north to Gould Lane on the south—a distance of two miles. The highway within these limits was undivided, striped for four lanes, 76 feet wide curb to curb, of adequate structural section, and with relatively straight alignment. Vertical alignment introduced an extra problem, since most of the major cross streets intersected at the summits of the hills. Typical conditions are illustrated in Figure 2. There is considerable roadside business with unrestricted parking. Developed areas east and west of the highway are residential. It was not considered economically feasible to purchase additional right-of-way or to widen the roadway because of high business property costs and, particularly, in view of near future freeway development. The improvement, therefore, had to take place within existing curbs.

In order to proceed logically with an improvement plan for the highway, a complete study and analysis of the conditions before improvement were necessary.

Heavy Turning Movements

First, as previously mentioned, Sepulveda Boulevard traffic was a barrier to local vehicle and pedestrian cross traffic. Second, because of the relatively few major through cross streets in this area, there existed a considerable volume of cross traffic and heavy turning movements at these major intersections. The intersections of Sepulveda Boulverad with the four major cross streets—Rosecrans Avenue, Marine Avenue, Manhattan Beach Boulevard, and Gould Lane (Figure 3) were controlled by existing two-phase, full-traffic-actuated, volume-density type traffic signals. This equipment provided the highest available type of isolated intersection two-phase control. These signalized intersections were all one-half mile or more apart, and, of course, were not co-ordinated to provide any progressive or platooned traffic flow. However, due to heavy left-turn traffic, the efficiency of the traffic-handling ability of these two-phase controls was poor.

Third, the accident records revealed a high rate of accidents with a predominance of the left-turn type at the major intersections, but showing also

Figure 2
Looking north on Sepulveda Boulevard (U.S. 101 Alternate), showing conditions before improvement. Marine Avenue at summit in background.

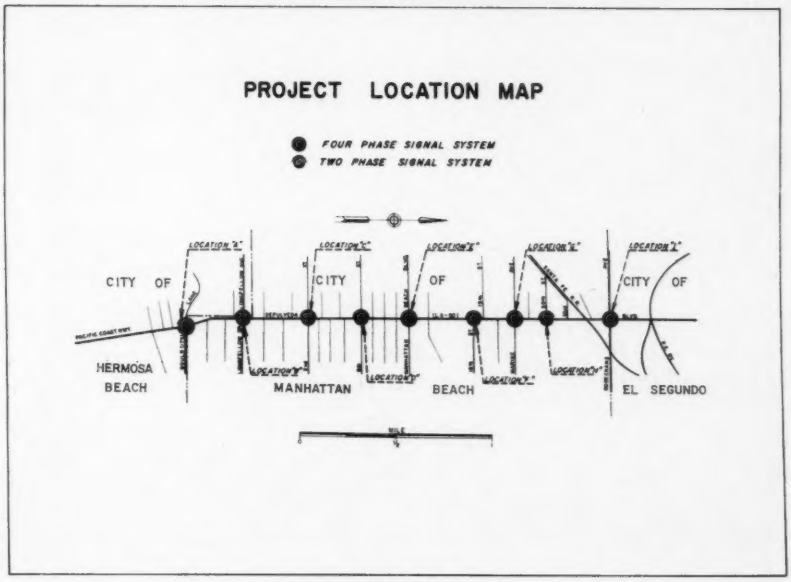

Figure 3

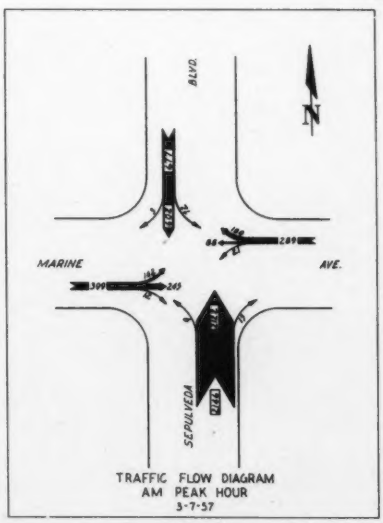

Figure 4

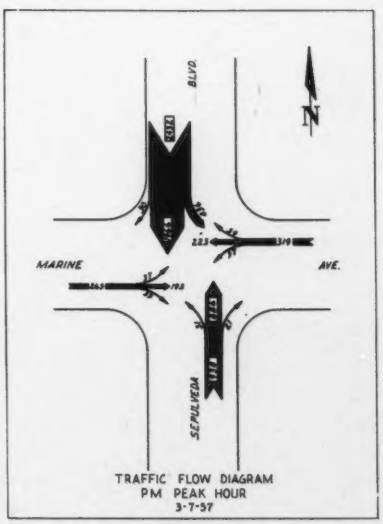

Figure 5

an abnormal number of head-on and rear-end types. At the minor intersections accidents were equally divided between intersecting, rear-end and turning types. The three-year study gave a total of 233 reported accidents —101 night and 132 day.

Fourth, the traffic flow pattern shown in Figures 4 and 5 is highly directional, being extremely heavy northbound in the morning with relatively few left turns, while in the evening the major movement is southbound with heavy left-turn traffic. This patttern is generally the same at all four of the major intersections.

Several Solutions Possible

An analysis of the above conditions led to consideration of a number of possible improvement solutions or plans.

1. To relieve the barrier problem, it would be necessary to provide gaps in the traffic flow along Sepulveda Boulevard by co-ordination of the existing traffic signals. These gaps in traffic would allow pedestrians and vehicles to cross Sepulveda Boulevard. Unfortunately, with the half mile and more spacing between the existing traffic signals, the platoons would spread out generally resulting in gaps too short to allow sufficient crossing time. To insure a gap of sufficient duration to allow crossing, traffic signals could be installed at intermediate intersections to provide approximately one-fourth mile spacing.

2. The conditions of heavy left-turn volumes and high turning and rear-end accident rates at the major intersections would only be alleviated by left-turn lane channelization and protective three-phase signalization. Five additional intermediate signals would provide a system consisting of nine signalized intersections all co-ordinated to provide progressive platooning of traffic. However, a platoon of traffic should be unobstructed in traveling through a signal system. Left-turn lanes were required at every intersection since one car waiting to turn left at an intermediate nonchannelized intersection may hold up one lane of the platoon, reducing the efficiency of operation by as much as 50 per cent. Therefore, a continuous divider providing left-turn lanes for all the cross streets was essential. This was, of course, also a solution to the head-on accident rate as well as other accident types between and at the minor cross streets.

Two Wide Roadways

With a continuous divider, the 76-foot roadway could be developed to provide two 31-foot roadways each consisting of two 11-foot lanes and 9 feet for parking, separated by a 14-foot curbed median. The median furnishes area for a 10-foot left-turn lane of varying length depending upon left-turn volumes.

The peak-hour traffic flow diagrams not only show the need for some type of left-turn phasing at the major intersections, but also show that the Sepulveda Boulevard traffic volume will require a relatively high percentage of the available green time. This means that long signal cycles will be needed during the peak hours, but shorter cycles will be sufficient during off-peak periods. Ideally, the cycles and resultant green times should match as nearly as possible the traffic volume demand. The equipment selected was, therefore, a master traffic computer to detect the traffic volume on Sepulveda Boulevard and select the proper background cycle.

In addition, the flow diagrams show a definite directional flow, extremely heavy northbound in the morning and southbound in the evening. It was necessary then to provide for directional detection and analysis. To adjust for the directional characteristic of the traffic, a second master traffic computer was selected. The cycle length for the system could then be determined by the computer detecting the heavier directional flow. A difference in directional flow could also be detected and preference given to the direction of heavier flow.

Continuous Supervision

The system thus developed may be called a co-ordinated variable cycle, preferential traffic-controlled traffic signal system. This provides continuous automatic supervision of the nine signalized intersections controlled by the vehicular traffic flowing on the highway.

The local intersection signal control selected was of the semi-traffic-actuated type, allowing side street green only on pedestrian and vehicular demand. This provides the maximum amount of green for Sepulveda Boulevard. The five minor intersections are two-phase and, as previously mentioned, the four major intersections required an additional phase for the left-turn movement.

The usual type of phasing used when the left turn is given separate phasing might be A phase for the through movement on the main artery, B phase for both left-turn lanes, and C phase for the cross street movement. Inspection of the typical flow diagrams will show that, due to a fairly well-balanced opposing left-turn volume during the morning peak hour, this type of phasing would be satisfactory. However, the evening peak-hour flow diagram will show extremely unbalanced opposing left-turn volumes which would result in very poor operating efficiency were this type of phasing to be used. Therefore the more standard phasing was abandoned. It was noted that all

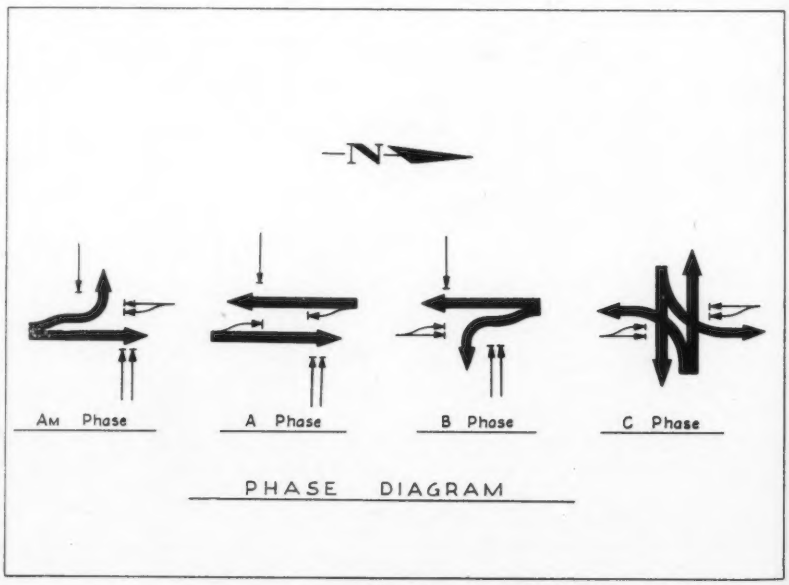

Figure 6
Phase diagram showing four-movement type of control.

four of the major intersections show similar traffic patterns. Furthermore, the pattern should remain fairly constant in the future because of the topography. The narrow strip of developed land between Sepulveda Boulevard and the Pacific Ocean is principally residential and incapable of generating a large traffic volume.

Convenient Pattern

The phasing shown in Figure 6 was therefore developed. It provides an overlapping green for the heavy southbound evening through movement during the heavy B phase left-turn movement. This is a very convenient traffic pattern in that the maximum amount of green time is utilized. During the morning peak hours, B phase traffic is light and southbound traffic is also light, so the additional green provided by the overlap was not needed. As B phase green time will be short due to light traffic demand, unused available green will be automatically added to the unactuated A phase green time. This additional green for A phase is greedily used up by the morning heavy northbound through traffic.

It may be noted that the phase diagram actually shows four movements. With the A, B, and C phasing as shown, something had to be done about the northbound to west left-turn movement. Although it is a consistently light movement, a protected left-turn phase was considered necessary because of the extremely heavy opposing southbound through movement in the afternoon peak period. An auxiliary minor movement controller was selected to provide an extendible and separately actuated phase, time for which is taken out of the beginning of the parent controller A phase green time. This phase is called the A minor phase, and, as shown on the phase diagram, merely holds up the southbound through movement until the northbound left-turn traffic clears.

Cost Total $185,400

The highway development and signalization discussed above were considered to be the most feasible improvement combination that would provide the traffic-handling efficiency desired. Plans and specifications for the improvement were then completed and the project advertised. The contract was awarded on August 8, 1956, and construction completed and accepted

Figure 7
Looking north on Sepulveda Boulevard from Manhattan Beach Boulevard, showing conditions of roadway after completed improvement. Note sampling detectors in right foreground.

Figure 8
Looking south from Manhattan Beach Boulevard, showing vehicles moving during A minor phase.

Figure 9
Looking north from Manhattan Beach Boulevard, showing 12-inch left-turn green arrow during A minor phase.

Figure 10
Looking north on Sepulveda Boulevard from Gould Lane showing 780 vehicles per hour left-turn movement.

on January 24, 1957, at a cost of $185,400. Figures 7, 8, 9, and 10 are views showing the completed improvement.

Following the completion of the system, the Division of Highways conducted a period of testing and adjustment to provide maximum operating efficiency. Seven pen graphic recorders were installed to provide a continuous record of the operation, both for the southbound traffic and for the northbound traffic. Figure 11 shows a graphical record of a typical day's operation, showing (1) the volume at any time on a per-hour, per-lane basis; (2) the cycle length being used at any time; (3) offsets in use, northbound, southbound preferential offsets, or average offsets. It may be noted that the chart is calibrated in per cent on the volume scale and that cycle lines are labeled A, B, C, D, E, and F. On the volume scale 100 per cent represents 1,000 vehicles per hour per lane. The lettered cycles have equivalent times as follows:

Cycle A—Free running or non-co-ordinated
Cycle B— 60 seconds
Cycle C— 65 seconds
Cycle D— 80 seconds
Cycle E—100 seconds
Cycle F—120 seconds

Smooth Operation

A comparison of the volume curve with the cycle lines will show that very light traffic will require cycle A or non-co-ordinated operation. With semi-traffic-actuated intersection controllers, a progressive band is non-existent during very light traffic conditions such that co-ordination is not necessary. Waiting time is reduced considerably. Cycle F will be required during the peak traffic load, with cycles B, C, D, and E used for traffic volumes between the heaviest and the lightest. The traffic volumes requiring the various cycles may also be taken from the curves. The volume to select a particular cycle is adjustable. That is, by adjustment of controls on the master supervisory equipment, any particular amount or volume of traffic detected may be chosen to select a particular cycle. Considerable refinement in these adjustments was necessary in order to provide smooth operation.

The offset timing for the various intersections also required some refined adjustment. The southbound preferential offsets for the two-phase controllers were set later than normal in relation to the three-phase intersections to allow the B phase overlap portion of a platoon to flow through the system. Normally the bottom of the through traffic band is determined by the beginning of B phase. However, in this particular system southbound, the bottom of this band is the end of B phase at the three-phase intersections, which means that the two-phase intersection offsets are additionally offset by the amount of B phase green time used at the three-phase intersections. The northbound preferential offset relationships were normal, as the bottom of the north-bound band is the beginning of B phase at the three-phase intersections.

An analysis of before and after operation indicates the traffic-handling ability of the system has exceeded all estimates. Traffic counts taken before and after have indicated an average total intersection peak-hour increase of about 15 per cent. The south-to-east evening peak-hour turning movement at all major intersections has increased approximately 100 per cent. The following are outstanding before and after peak-hour comparisons:

Northbound through movement:	BEFORE	AFTER	% INCREASE
A.M. peak hour at Rosecrans ...	2,900	3,250	12
A.M. peak hour at Gould Lane ..	1,300	1,500	12
Southbound left-turn movement:			
P.M. peak hour at Marine	200	436	118
P.M. peak hour at Gould Lane ..	390	780	100
Eastbound through movement:			
A.M. peak hour at Gould Lane ..	169	448	165

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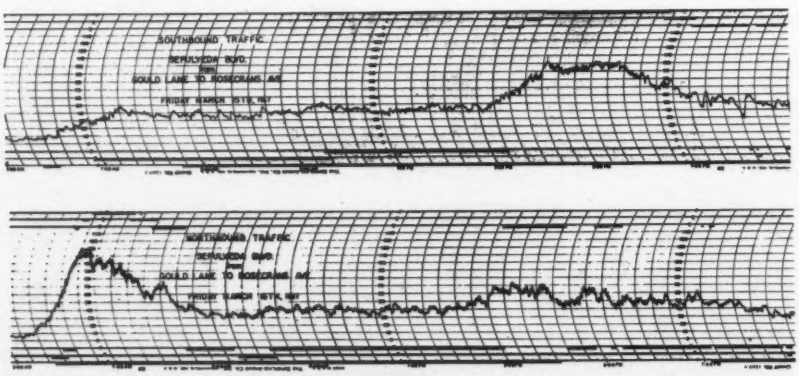

Figure 11
Graph showing typical day's operation of the variable cycle system. The 100 on the chart represents 1,000 vehicles per hour per lane. Horizontal heavy lines show cycle in use, except Cycle A, which indicates desire for preferential offset.

The One-Way Preference Street

A New Concept in Traffic Control

by Craig Weingarten
Institute of Transportation
and Traffic Engineering
University of California
Los Angeles

AMONG THE MANY standard techniques used by the traffic engineer to improve traffic flow is the one-way street system. Significant increases in the capacity of a pair of streets can be effected merely by posting a few signs and by modifying some pavement markings. However, although these engineering changes are inexpensive and relatively simple to make, unfortunately the political and social difficulties encountered often become of major importance, and may in fact prevent the engineering modifications. Changing signs is easy, but changing the living and traveling habits of many thousands of people may constitute a formidable task.

For instance, businessmen and property owners will often oppose the conversion of two-way to one-way streets because they fear that their business will decrease or possibly because they anticipate increased difficulty for delivery trucks. In addition to the job of trying to satisfy these people and other groups who have similar complaints, the traffic engineer also has the job of persuading the general public to accept the greater driving distances which will become necessary, to adapt to left-side parking, and to accept a great variety of other changes in their driving habits.

Probably even these sociological disturbances and political resistances would not cause nearly so much difficulty were it not for the fact that they all arise at once. If some method could be devised by which the necessary changes could be made gradually over a period of time rather than in a single sudden move, these problems might be minimized, maybe even eliminated. This paper proposes "the one-way preference street" as an answer to these problems. It is recognized that the concepts expressed will not be new to many traffic engineers — but it is believed that this may be the first time they have all been set down in one place.

The One-Way Preference Street

The one-way preference street is seen as an intermediate step between the conventional two-way street and the conventional one-way street. It is a street on which two-way traffic is permitted but where preference is given to traffic flow in one direction at the expense of flow in the other direction.

Normally these streets would be established in pairs, so that traffic moving on one of these streets in the unpreferred direction could, by merely moving to the other street of the pair, be traveling in the preferred direction. This plan should minimize the shock due to the changing from two-way to one-way street operation.

To illustrate, let us select a pair of streets where one-way operation might be desirable, but because of various complications of the sort discussed above, the actual conversion of the streets to one-way operation would be very difficult. Faced with this problem, the engineer may still find it possible to modify traffic controls to give preference to traffic flowing in one direction on one of the pair of streets and in the opposite direction on the other of the pair. In other words, if total one-way operation is impossible, the engineer can do the next best thing; he can give each direction of traffic movement a path along which it may travel with as little impedance as possible.

The transition from the two-way street to the one-way preference street and the full one-way street may include the following steps:

1. One-way signal progression — The traffic signal timing should be modified such that there will be perfect progression in the direction of preferred flow respectively on each street.

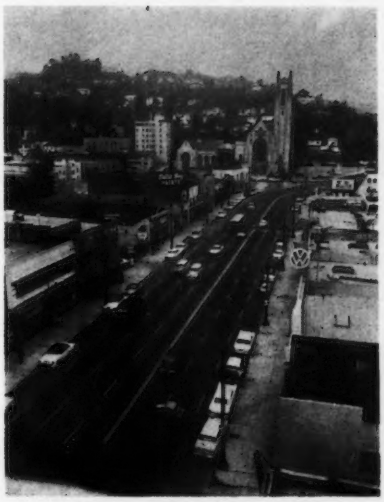

Figure 1
A one-way preference street with three lanes in the preferred direction and two lanes in the unpreferred direction. Additional capacity in the preferred direction can be obtained by prohibiting curb parking at the left of the picture.

This action will probably result in the signals being rather poorly synchronized for flow in the opposite or unpreferred direction, but again, traffic which finds itself moving in the "wrong" direction can, by merely shifting to the other street, be traveling in the "right" direction. It is expected that as time passes, people will learn of the differences in the two streets, and will gradually perform this shift.

Because now the signals are being synchronized for one-directional flow instead of a necessary compromise between the needs of flow in two directions on the same street, certain advantages will accrue.

A progression speed may now be established, which is not restricted by the geometric spacing of signalized intersections and which should be fairly well in keeping

Figure 2
A one-way preference street with three lanes in the preferred direction and one lane in the unpreferred direction. As in the case of most one-way preference streets, a parallel street with preferred flow in the opposite direction is located nearby.

with the needs of the traffic, speeding up, for instance, through relatively unsettled areas, while slowing through congested districts. In addition, new signals may be added where needed, at mid-block crosswalks, for instance, without destroying the progression pattern.

2. *Preferred flow extra-long green period*—As the proportion of traffic on each street becomes greater in the preferred direction, the unpreferred direction of traffic will not need such a long green phase. If then, the signals are modified to restrict the green period for the minor direction, a period would be provided during which left turns could be made from the preferred direction unimpeded by opposing traffic. Figure 3 shows how an actual installation might be retimed.
3. *Minor direction left-turn prohibition*—To further encourage travel in the preferred direction, and to remove one more impediment to preferred flow, left turns from the unpreferred direction might be prohibited.
4. *Offset centerline* — At this stage, traffic counts should indicate that the traffic on each street would be served much better if the centerline were shifted to provide for one extra lane in the preferred direction. A street with three lanes in each direction, for instance, would convert to four lanes in the preferred direction and two lanes in the unpreferred direction.

   The width of some streets will permit this step to be taken without any real sacrifice by the unpreferred traffic. For instance, if the street is wide enough for five lanes (two and one-half lanes in each direction), the centerline need be shifted by only half a lane to provide the effect of one additional full lane in the preferred direction.
5. *Prohibited Parking* — To further increase the capacity of the street in the preferred direction, parking could be restricted during peak hours or even prohibited at all times in the direction of preferred flow. This too would provide an extra traveling lane in the preferred direction. Parking might remain on the unpreferred side, where cars backing into a parking place as well as cars at the curb will not impede the main traffic flow.
6. *Complete One-Way Streets:* This is the final step in the conversion.

During the transition stages, it might be found beneficial to route local buslines down the streets in the unpreferred direction so that through traffic will not be impeded by buses stopping to load or unload passengers. The bus schedule will probably not be hurt to any degree since a bus which must make frequent stops cannot keep up with the normal signal progression. Finally, express buses could be routed with the preferred direction. Not only would the express bus be able to travel faster but transit patron confusion with the local buses would be eliminated.

It should be noted that the above mentioned steps need not occur in the specified order, nor in fact will all steps be necessary in every case. Much will depend upon the judgment of the traffic engineer.

The One-Way Preference Street As An End In Itself

Up to this point, we have considered the one-way preference street only as an interim measure. However, there may be substantial advantages in using this measure as a traffic engineering technique in its own right. The traffic engineer may find a number of situations where the establishment of complete one-way streets is impossible, but where the one-way preference street in itself offers a very satisfactory final solution. One can, therefore, "have his cake and eat it" by gaining some advantages of one-way streets while still retaining some of the more important advantages of two-way streets.

Conclusion

It is recognized that in this plan, as in many other types of traffic engineering techniques, some traffic will be inconvenienced. However, the plan can be expected to improve the overall traffic situation.

It should again be emphasized that the ideas outlined here are not rigid, that the manner in which any changes can be instituted will depend very much on the local political, sociological and engineering situations. It is felt, therefore, that careful thought must be given to any contemplated changes, but if this is done, there will be great opportunity for the improvement of traffic flow in many areas in which changes might otherwise be impossible.

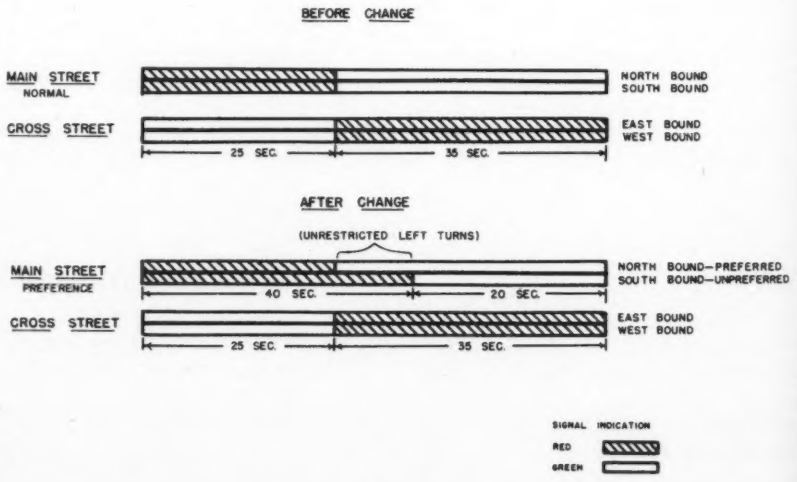

Figure 3
Chart showing how a signal at a typical intersection on a one-way preference street might be retimed to shorten the green period for flow in the unpreferred direction. Note that this results in a period during which left turns from the preferred direction are unrestricted by opposing traffic.

How Access Control Affects Accident Experience

By The Division of Highway Transport Research
U. S. Bureau of Public Roads
Reported by CHARLES W. PRISK
Director, Highway Safety Study

This report appeared originally in the December 1957 issue of *Public Roads*.

NEW EVIDENCE has been developed to document the striking safety benefits in the offing for users of the National System of Interstate and Defense Highways now under construction. Full control of access is the key feature in the outlook for safer travel.

Control of access is sometimes regarded as a relatively recent highway refinement. In many ways, however, nearly all of the important design advancements that have gradually evolved to make our highways safer serve also to control access. The grade separation of intersecting highways, for example, is control of access to the extent that the conflicts created by entering and leaving vehicles are eliminated through design of the separation structure and its connecting ramps for interchange traffic. Similarly, the physical division of a highway with a median area introduces access control of a degree because it prohibits or at the very best discourages left-turn access to abutting property.

A few years ago the Bureau of Public Roads invited the cooperation of the State highway departments in a survey of accident experience on controlled access routes. This effort, still continuing, has produced some convincing facts concerning the superior safety associated with control of access.

In most instances, data were obtained for pairs of routes or for abutting sections of highway serving the same general area—one highway with full or partial control of access, and the other a conventional major traffic route without access control. The access control concepts and nomenclature follow the standard definitions approved by the American Association of State Highway Officials. In other words, "full control of access" means that access is provided with selected public roads only and that crossings at grade and direct private driveway connections are prohibited. Where the term "partial control of access" is mentioned, the highway is of a somewhat lower order, and may have some crossings at grade and some private driveway connections.

Table 1 presents the Bureau's most recent compilation of accident experience on highways with full, partial, and no control of access, and was prepared from special reports from 27 States. These data include a total of 47,000 accidents, 30,000 injuries, and nearly 900 deaths occurring on 2,093 miles of highway study sections, and were assembled from records for various years, 1949 through 1955.

Freeways Are Safer

As the mileage figures indicate, composite results are preponderantly weighted by rural sections where fatality rates are commonly higher, and accident rates lower than in urbanized areas. However, for the aggregate experience, drivers on highways with fully planned access are roughly two and one-half times safer from fatalities, injuries, and accidents on a miles-traveled basis than their companions on comparable highways without access control.

The safety characteristics of the fully controlled access highway, which in standard nomenclature is better known as a freeway, are outstanding in the category of rural area fatalities. For example, as table 1 shows, the fatality rate on rural freeways is only one-third that of rural highways without access control, 3.4 deaths per 100 million vehicle-miles in contrast with an average of 10.3 deaths. This finding is heartening indeed when it is remembered that three-fourths of the Nation's traffic deaths now occur outside of urban areas. By contrast, heavy losses in property damage and non-fatal injury accidents are chiefly concentrated in urban and suburban areas. The safety merits of metropolitan area freeways are distinguished more by their markedly lower accident and injury rates, rather than by their improved fatality rates. Full control of access thus offers vital safety advantages for both rural and urban locations.

Table 1.—Accident experience on highways in 27 States with full, partial, and no control of access [1]

Area and degree of access control	Length of study sections	Vehicle-miles of travel	Number of accidents	Number of fatalities	Number of injuries	Rates per 100 million vehicle-miles of travel		
						Accidents	Fatalities	Injuries
Urban:	*Miles*	*Thousands*						
Full control	75.6	1,318,848	2,556	29	1,169	194	2.2	89
Partial control	35.4	573,321	2,997	32	943	523	5.6	164
No control	119.4	1,813,534	9,092	74	4,739	501	4.1	261
Suburban:								
Full control	24.5	198,746	273	8	180	137	4.0	91
Partial control	99.1	613,374	2,253	34	961	367	5.5	157
No control	140.0	1,527,589	7,349	78	5,998	481	5.1	393
Rural:								
Full control	366.5	4,063,863	6,340	137	5,514	156	3.4	136
Partial control	579.0	2,396,668	5,002	151	3,536	209	6.3	148
No control	653.4	3,222,890	11,102	332	6,886	344	10.3	214
Totals:								
Full control	466.6	5,581,457	9,169	174	6,863	164	3.1	123
Partial control	713.5	3,583,363	10,252	217	5,440	286	6.1	152
No control	912.8	6,564,013	27,543	484	17,623	420	7.4	268
Grand total	2,092.9	15,728,833	46,964	875	29,926	298	5.6	190

[1] Data included are for various years, 1949–55, inclusive.

Full and Partial Access Control Compared

The hazards of incomplete treatment of the access problem are interestingly revealed by the accident records included in table 1 for facilities with only partial control. Fatality rates for sections having partial access control are highest on the urban and suburban sections studied, 5.6 and 5.5, respectively. Significant too is the fact that urban and suburban accident and injury rates are roughly double those found on comparable highways with fully planned access. On rural highway sections, the death rate with partial control is nearly twice that found on highways with full control of access.

Another facet of the study concerns the types of accidents that occur. The experience shows that on highways with full control of access, approximately 60 per cent of the accidents involve rear-end collision or same-direction sideswipe. On routes with partial or no access control, the crashes in this category are roughly 40 per cent of the total.

Rear-End Collisions, a Problem on Freeways

The higher percentage of rear-end or same-direction collisions on freeways is a matter for serious concern. Checking further, it is found that the rate for rear-end collisions on rural freeways is about 90 per 100 million vehicle-miles, which is substantially the same as that for rear-end collisions on other rural highways covered by the study. On urban freeways, however, rear-end collisions occur at an approximate rate of 130 per 100 million vehicle-miles, and at twice that rate on urban routes without access control. If the freeway has an Achilles heel, it is in its susceptibility, accidentwise, to driving actions that set up speed differentials, and rear-end collisions. In this connection, the points of entrance and departure are critical ones, and further design refinements will be needed on ingress and egress facilities.

It is heartening to find that on highways with full control of access, fewer than 10 per cent of the accidents involve head-on collision, angle collision, and collision with pedestrians. The corresponding values for highway sections with partial or no access control are much higher, ranging from about 35 to 50 per cent. This difference is of much importance, for it involves those types of collisions that most frequently cause serious injury or death. The lower incidence of these severe collisions accounts in the main for the low fatality rate.

The world's most renowned highway design, the planned access freeway, clearly sets the scene for superior service to future traffic on the Interstate System. Now that additional mileages of interstate routes are being constructed and opened to traffic, it seems certain that the access control feature will persist as a prime value in highway safety.

CASE HISTORY

(Continued from page 20)

No Left Turn Accidents

Although the five months since the improvement was completed is a relatively short period for before and after comparison of accident data, the following tabulation indicates a definite decrease in accident severity without showing conclusively a reduction in total number of accidents.

Type of accident	*5 months before improvement*	*5 months after improvement*
Personal injury ...	17	10
Fatal	4	0
Total, all types ...	54	51

Accident records available at this time are not complete. The local authorities have indicated, however, that the left-turning type of accident off Sepulveda Boulevard has virtually disappeared. It should be noted also that the improvement in the accident picture has taken place in the face of considerably increased traffic volumes.

Although the system is handling an extremely heavy load of traffic, there may be the need in the near future for still more capacity. The equivalent of a full additional traffic lane can be obtained for each direction on Sepulveda Boulevard by the peak-hour prohibition of parking. All of the cross streets except the east legs of Marine Avenue and Gould Lane and the west leg of Manhattan Beach Boulevard are two-lane streets. All of the major cross streets can be widened. Providing additional lanes on the side streets would allow the allotment of more green time to Sepulveda Boulevard and still handle side-street traffic. The peak direction lane capacities being handled by this system approach those normally associated with freeways. This results from the minor cross-street traffic and the extreme directional pattern which makes it possible to assign maximum green time to the heavy move without unduly penalizing the cross-street traffic.

The outstanding achievement of the installation is the fact that proper channelization, coupled with an advance type of electronic traffic control, has accomplished the equivalent traffic service of constructing an additional lane of pavement each direction over a two-mile section of highly developed highway, and done so at a fraction of the cost.

Acknowledgments

The project was conceived and completed by State of California, Department of Public Works, Division of Highways; George T. McCoy, State Highway Engineer, Chief of Division; George M. Webb, State Traffic Engineer. In District VII design and construction were under the direction of Assistant State Highway Engineer Edward T. Telford, with design engineering under the supervision of Robert W. Van Stan, District Traffic Engineer; Project Engineer was Bert H. Clark; Design Engineer Ted L. Morehead also completed the adjustments and testing operations.

FREEWAY INTERCHANGES

(Continued from page 14)

general characteristics of traffic to provide a higher type facility than the volume actually demands. It should also be remembered that the sections of freeway between interchanges must usually function as weaving sections and should be considered as such in the design. It may, in cases where intersections fall closer together than would allow sufficient weaving distance, be necessary to keep some of the movements separate and provide two roadways in each direction between the interchanges.

Publications which will aid the engineer in the selection and design of interchanges:

1. American Association of State Highway Officials. *A Policy on Arterial Highways in Urban Areas.* Chapter J—Interchanges, July, 1956.
2. American Association of State Highway Officials. *A Policy on Geometric Design of Rural Highways,* 1954.
3. Institute of Traffic Engineers and Association of Casualty and Surety Companies. *Traffic Engineers Handbook,* 1950.

On the Connecticut Turnpike

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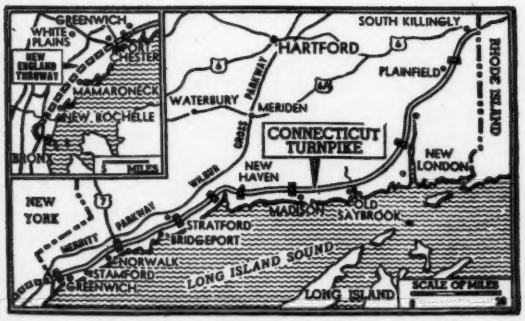

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Traffic News

Freeway Operations Seminars Announced By the Institute

Ten seminars to discuss traffic operations on freeways will be held in 1958 and 1959, the Institute of Traffic Engineers has announced. Four seminars are planned for this year, with the remainder to be held in 1959.

The first seminar is scheduled for Columbus, Ohio, late in April. Following seminars will be held in other areas, distributed so that those interested will in general not have to travel great distances.

The seminars have been planned in recognition of the fact that the new freeways to be built in the coming years will present many new and different problems. Officials at all levels of government will meet new problems during the planning and construction stages, and especially in the operation of the new facilities.

A team of speakers and discussion leaders, each of whom has had experience with this type of roadway, will guide each seminar. Responsible officials of state, county and city government within a 300-400 mile radius of the seminar will be invited to attend.

Leaders at the Ohio seminar will include:

B. W. Marsh, AAA, Washington, D.C.
E. R. Ricker, New Jersey Turnpike Authority
O. K. Normann, U.S. Bureau of Public Roads
D. W. Loutzenheiser, U.S. Bureau of Public Roads
A. F. Malo, Detroit Dept. of Streets and Traffic
Lt. John L. Bishop, Ohio State Highway Patrol
Inspector W. H. Polkinghorn, Detroit Police
Joseph E. Havenner, President, Institute of Traffic Engineers.

A local committee of the Ohio Section of the Institute of Traffic Engineers is responsible for arrangements for the first seminar. General Chairman is Harold G. Eckhardt of the Ohio Department of Highways, assisted by M. C. Condrey of Cincinnati and J. V. Musick of Columbus. Program planning has been the project of a steering committee of the Institute. Serving as chairman has been E. G. Wetzel, of the Port of New York Authority. He has had the help of a committee of engineers appointed by Joseph E. Havenner, president of the Institute.

"Many public officials are going to have new problems—and big problems — when freeways start operating in their jurisdictions," said Mr. Havenner. "The new highway program is going to bring a tremendous challenge to officials of many cities, counties, and even states which have never experienced anything like this before."

"These seminars are being planned to help local officials meet this challenge as it develops," he said. "Not only will there be problems on the freeways, but on adjacent streets and roads as well. Those who have been through it can be of real help to those who have yet to face it."

The Automotive Safety Foundation is cooperating with the Institute in presenting this series of seminars.

IACP Urges Consideration of Police Needs on New Highways

The International Association of Chiefs of Police at their recent convention adopted a resolution which urges that engineers give full consideration to police needs and problems in the planning and development of highway construction.

The resolution specifically mentions freeways and limited access highways and the police patrol problems which these new types of facilities present. The convention resolution recommended "to the American Association of State Highway Officials, the Institute of Traffic Engineers, and the U.S. Bureau of Public Roads, that full consideration be given to policing needs and problems in the planning and development of highway construction."

The Institute of Traffic Engineers has recognized this interest on the part of the police by including them in the planning for the Freeway Operations Seminars being sponsored by the Institute. Two police officers, one city and one state, will participate in the Columbus Seminar scheduled late in April. Other police will take part in following seminars according to present plans.

President's Committee For Traffic Safety Thanks ITE

In a recent letter, received by President Havenner, the ITE has been thanked by H. H. Curtice, Chairman of the President's Committee for Traffic Safety, for its part in the lowered death toll in 1957. The letter follows:

February 10, 1958

Mr. Joseph E. Havenner, President
Institute of Traffic Engineers
2029 K Street, N. W.
Washington 6, D. C.

Dear Mr. Havenner:

I know you must be as highly gratified as I am to learn that the National Safety Council has reported a significant decrease in traffic fatalities in 1957. The number of deaths declined to 38,500 — 1,100 less than in 1956 — and the mileage death rate dropped from 6.4 to an all-time low of 5.9.

This is a convincing demonstration that we are on the right track and gaining momentum in our advocacy of a broad, balanced attack on traffic accidents by public officials and of organized public support for such an attack. It should encourage an intensified effort to achieve the substantial further reduction in traffic hazards that we all know is both imperative and possible.

As Chairman of the President's Committee for Traffic Safety, I wish to commend the Institute of Traffic Engineers for the great contribution it made to last year's achievement, both independently and through participation in the program of the Advisory Council of the President's Committee.

Sincerely,
H. H. Curtice,
Chairman

Northwest Traffic Engineering Conference Held at Corvallis

More than 150 state, county and city traffic and related officials met at Oregon State College, Corvallis, Oregon, January 22-24 for the 11th Annual Northwest Traffic Engineering Conference sponsored jointly by the Oregon State Highway Department, Oregon State College and the Western Section of the Institute of Traffic Engineers.

The primary purpose of the Conference was to promote the exchange of ideas in traffic engineering and to keep traffic engineers abreast of current news in the field. This quite adequately was accomplished through the dissemination of ideas and information during the panel and free discussions.

Panel discussions were held on the following topics: "Interstate Highway System and the Community," "Urban Arterial Planning and Standards," "Oregon's Manual on Uniform Traffic Control Devices," "New Traffic Engineering Developments in the Northwest" and "New Manufacturer's Products." Panel moderators were: G. S. Paxson, Assistant Highway Engineer, Oregon; Sid King, Assistant Manager, Oregon Motor Association; Rex Still, Traffic Engineer, Washington; Roy Sawhill, University of Washington; and J. Al. Head, Assistant Traffic Engineer, Oregon.

Traffic Engineers from Idaho, Oregon and Washington, as well as from Portland, Seattle, Tacoma and Eugene, participated in the several panels. Other members of the panels were lay representatives of the press, public support groups and legislators.

William M. Tugman, publisher of the Port Umpqua Courier and former publisher of the Eugene Register-Guard assailed city planning for failure to keep pace with facts of modern traffic, in delivering the keynote address. Tugman said that off-street parking is an absolute necessity in urban replanning. "We have all seen," he stated, "the tremendous and costly dislocations of businesses which have resulted from lack of planning and absence of modern traffic management." He advocated changes in zoning laws which would make it possible to set aside areas for industrial development large enough to provide parking for all workers and changes in laws governing central business areas to require every new structure to be provided with enough parking for all occupants.

Mr. Tugman admonished the assembled traffic engineers from Oregon, Washington and Idaho, to see that their reports on traffic conditions and traffic problems reached every editor's desk in affected areas in order to better call attention to existing traffic problems. "We must learn to work together to educate the public that what we are trying to do is good sense, not dreamers fancy," Tugman said.

11th Annual NW Traffic Engineering Conference: Panel on Urban Arterial Planning. Left to right: Moderator: Roy Sawhill, University of Washington; R. C. Blensly, Planning Survey Engineer, Oregon; Tom Edwards, Construction Engineer, Oregon; Ted Dec, Bureau of Public Roads, Oregon; Lloyd Anderson, Bureau Municipal Research, Eugene, Oregon.

11th Annual NW Traffic Engineering Conference: Panel on Application of Traffic Engineering Principles. Left to right: John Bushnell, Councilman, Salem, Oregon; Yosh Kosai, Tacoma, Washington; Robert Dunn, Asst. Traffic Engineer, Washington; Bruce Culver, Asst. Traffic Engineer, Seattle; V. P. Johnson, Traffic Control Engineer, Oregon; Don Bergstrom, Asst. Traffic Engineer, Portland.

Another highlight of the program was the new section added this year in which manufacturers representatives participated and presented new products which were not presently catalogued by their companies. This was found to be most helpful to the operating traffic engineer and served to acquaint many with new ideas, some of which were on the drawing boards, in the field test status and others ready for marketing.

General Motors To Promote Better Headlight Aim and Use

A nationwide "Aim to Live" campaign for better night vision on the highways has been announced by General Motors.

The program has been undertaken, according to President Harlow H. Curtice, in recognition of the fact that the mileage death rate at night is three times worse than during the day and that more than half the cars on the road have headlights improperly aimed.

The General Motors "Aim to Live" campaign is directed at:

1. Urging every motorist to have his headlights aimed immediately and then have them regularly inspected twice a year.

2. Encouraging motorists to observe the "dimming" rule on streets and highways.

3. Alerting drivers to limit their speed at night so they can come to a safe stop in the vision distance their headlights afford.

GM is enlisting the aid of its 19,000 car and truck dealers plus thousands of independent garages and service stations in this campaign to promote safety-aimed headlights for all makes and models of cars and trucks. Aiming

takes only a few minutes of a motorist's time.

In addition, a broad educational and informational program on the hazards of night driving and tips on night driving safety will be carried out through pamphlets and posters, films and speakers, millions of pieces of direct mailing to motorists, and public service advertisements on night safety. A pamphlet that can be inserted in driving training kits in schools also will be distributed.

GM also is advising all top safety authorities, civic and business leaders, government officials and traffic experts of the night safety campaign. Service clubs, school and safety groups will be urged to emphasize night safety in their traffic campaigns.

"I urge every motorist to join this 'Aim to Live' campaign," Mr. Curtice said. "Properly aimed headlights, together with correct dimming habits and alert driving, can help stem the loss of so many lives on our highways at night."

The tremendous potential in saving of human life can be measured by the fact that if the night accident rate could be cut to the daytime average on miles driven, "we would save 15,000 lives a year," Mr. Curtice stated.

He pointed out that the critical need for proper headlight aiming of all cars was recognized at last September's annual meeting of the American Association of Motor Vehicle Administrators.

These state officials stressed in a resolution "the importance of proper headlight aim" and re-emphasized the "need for regular inspection of aiming."

Better night vision has been a matter of vital concern to General Motors and the rest of the industry for many years, Mr. Curtice said. Many years of research preceded adoption of the sealed beam headlamp in 1940, a significant advance in night safety. Similar research produced the new four-lamp system. The four-lamps increase driver vision by at least 15 per cent.

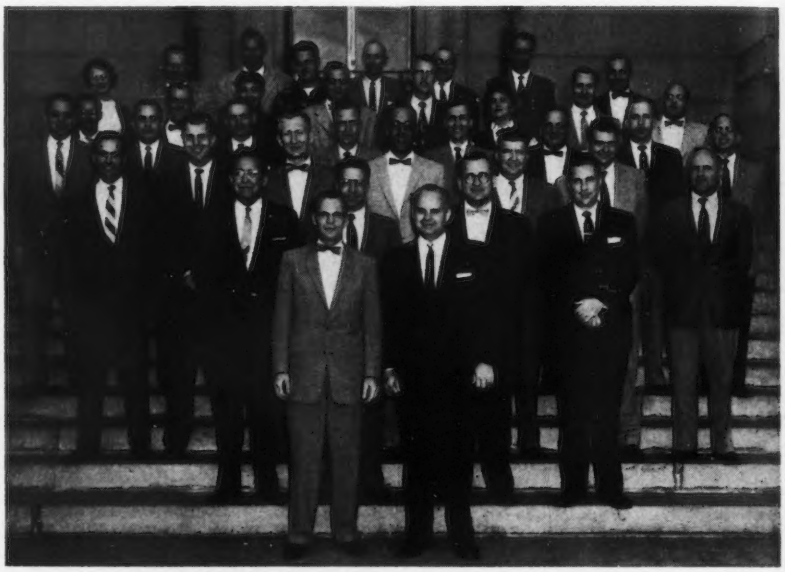
Regardless of whether cars are equipped with two or four headlights, Mr. Curtice said, all should be checked for adjustment at least twice a year. Although headlight aim is checked on all new cars, he explained, normal road shock, impacts while parking and "settling in" of suspension systems can vary the aim at the headlamp by a fraction of an inch.

This fraction can mean lights aimed too far to either side, or too high or too low for safe vision. Up to 80 per cent of the light needed for safe driving is lost under these conditions.

"We owe it to ourselves, our families and our neighbors to 'Aim to Live'," Mr. Curtice declared. "Sparing minutes for headlight aiming now might spare lives later."

LA Dept. of Traffic Engineering Personnel

Late in December, the engineering personnel of the Los Angeles Department of Traffic posed for a picture. The 37 engineers include 20 Institute members, with applications filed for several of the non-members. Those with current membership in the Institute are indicated in the caption below the photograph.



The personnel are as follows with membership in the Institute indicated.
Front row: L. M. Braff, ITE; S. S. Taylor, ITE.
Second row: L. W. Gardner, ITE; G. W. Skiles, ITE; W. H. King; R. Finlay, Jr., ITE.
Third row: H. Gilman, ITE; C. Fredrickson, ITE; M. Olson, ITE; J. Hardy, ITE; R. Warr, ITE; L. Clearwater, ITE; D. Terry, Jr., ITE.
Fourth row: W. Braff, ITE; K. Jagenburg; F. Helliwell, ITE; F. Dane; R. Colpitts, ITE; G. Helliwell, ITE; S. Spitz, ITE; G. Prather, ITE.
Fifth row: M. Huber; L. Thoin, ITE; H. Woo; J. Wilson; S. Knapp; H. Leavitt; A. Fluster; L. Nepsund.
Sixth row: N. Stazer; G. Knott J. Funk; J. DeMuth; N. Dunwell, ITE; K. Axelrod; F. Davis; J. Fuller.

New Film Available On Metropolitan Transportation

A new sound film in full color entitled "Millions on the Move" has been produced by General Electric as a public service. The subject of the film is metropolitan transportation, and the film makes a plea for coordinated public transportation, including urban freeways and adequate rapid transit facilities. The objective of the film is the encouragement of transportation planning as a part of over-all city planning and recognition of the fact that public transportation requires public support, legislation and financial aid. The film, which is 27 minutes in length, may be borrowed from local General Electric apparatus sales offices.

Training Opportunities

March 17-21 — 3rd ANNUAL SHORT SCHOOL ON TRAFFIC ENGINEERING — Sponsored by Texas Transportation Institute and CE Department of Texas A&M, Texas Section of ITE, and League of Texas Municipalities. For those concerned with traffic engineering functions of both cities and states. Attendance limited to 40. Contact: Charles J. Keese, Short School Director, % Dept. of Civil Engineering, A&M College of Texas, College Station, Texas.

(Continued on page 43)

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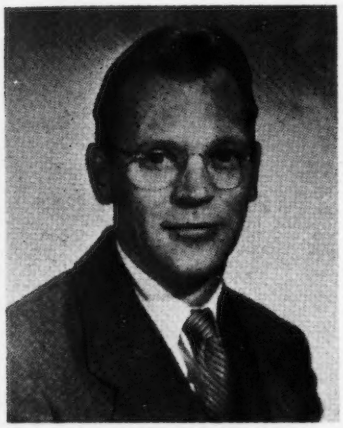
New Appointments

Braff Named to New Post in Dallas

Lloyd M. Braff (Member, ITE) has been named Executive Director of the Central Business District Association in Dallas.

Since 1954, Braff has been General Manager of the Department of Traffic in Los Angeles.



Lloyd M. Braff

Earlier, Braff served as City Traffic Engineer in Dallas from 1950-1954. He came to Dallas from DeLeuw Cather in Chicago for whom he made traffic and transportation studies in more than 20 cities throughout the country as well as in Venezuela and Colombia. Prior to his work with DeLeuw Cather, he had been employed in the Detroit Traffic Engineering Bureau and as an engineer with the Chicago Surface Lines.

Born in Minnesota, Braff received his B.S. in Civil Engineering from the University of North Dakota in 1936. He has been active in committee work for the Institute of Traffic Engineers and with the Jaycees. He has received wide acclaim for his work in Los Angeles as the first General Manager of that city's Department of Traffic.

Pollard Named Partner in Bartholomew Firm

William S. Pollard (Assoc. Mem., ITE), chief engineer of Harland Bartholomew and Associates, has been named a full partner in the firm.

Pollard came to Bartholomew organization as chief engineer in 1955 from a post as assistant professor of civil engineering at the University of Illinois. In responsible charge of all civil engineering work of the organization, Pollard's activities with the

William S. Pollard

Bartholomew firm have included studies of expressways, major streets and highways, traffic, parking and mass transportation in such cities as Indianapolis, Ind., Richmond, Va., Duluth, Minn., Louisville, Ky., Miami Beach, Fla., and Memphis, Tenn. In Memphis and Shelby County, Tenn., Pollard's current work on the Interstate Highway System has progressed to the actual design phase, in association with Clark, Daily and Dietz, civil engineers.

In addition to teaching, Pollard's previous experience also includes work as civil engineer for the Illinois Division of Highways on a number of research projects, and research and engineering projects on the Alaska highways. He was graduated from Purdue in 1948.

McDaniel Appointed Lubbock Traffic Engineer

B. M. McDaniel (Jun. Mem., ITE) has been named City Traffic Engineer for Lubbock, Texas. In this spot he succeeds Robert C. Chester, who is now Associate Traffic Engineer in Denver. McDaniel previously served as Traffic Engineer in Owensboro, Kentucky, where he spent a little over three years. Earlier he had been Assistant City Traffic Engineer in Evansville, Indiana.

Elected a Junior member of the Institute of Traffic Engineers in September 1957, McDaniel was also active in work of the Kentucky Municipal League, where he had served as both Secretary and later as Chairman of the Public Works Section.

Curtiss Joins ARBA On Special Assignment

C. D. (Cap) Curtiss, (Honorary Mem., ITE) who retired January 1 as U.S. Commissioner of Public Roads, has been named as Special Assistant to the Executive Vice President of the ARBA. In this capacity, he will carry out numerous special assinments for the association.

Initially, Mr. Curtiss will make an extended lecture tour around South America under the auspices of the International Road Federation. He will speak at various technical universities and before national road associations at eight Latin American countries. He will also consult with the various highway officials in each of these countries.

Sailing from New York on February 12, Mr. Curtiss will visit Brazil, Uruguay, Argentina, Chile, Peru, Ecuador, Colombia and Panama. He will return to Washington in April. Included in the lectures will be subjects pertaining to the U.S. highway plan, planning and financing of highways in the United States, and secondary low cost roads.

New Publications

Traffic Signal Settings

By F. V. Webster, Road Research Technical Paper #39, Road Research Lab., Her Majestys Stationery Office, London. 1958. 2s6d. 44 pp. (Available from British Information Services, 45 Rockefeller Plaza, New York 20, N.Y.)

This paper reports an investigation into traffic signal settings and expected delays to vehicles. It deals with fixed-time signals, and was made using a high-speed electronic computer to simulate the behavior of traffic at the signals. A formula for delay has been developed and used to determine two simple relations for the green times and also cycle to give the least delay to all vehicles using the intersection.

Mr. H. W. Glanville, in a forward, suggests that the results may be used to measure gains expected at signal controlled intersections from highway improvements, prohibition of right turns (left turns in U.S.) and parking prohibitions.

Traffic Design of Parking Garages

Revised Edition. By Edmund R. Ricker. Eno Foundation for Highway Traffic Control, Saugatuck, Conn. 1957. 169 pp.

PLANET OVERHEAD SIGN STRUCTURES

erected with minimum traffic interference

There's no need to close lanes or reroute traffic when a Planet overhead sign is erected. When erection crews put the light-weight, all-aluminum overhead structure in place there is a minimum of traffic interference. Note that cross-member design permits several inches of tolerance if footings are not exactly aligned. These fast erection features substantially lower erection costs.

All-aluminum sign structures engineered by Planet are rugged. They offer maintenance-free support for large overhead signs and lights that will withstand hurricane force winds. No painting is ever required and there are no rust problems.

In accordance with your specifications, Planet will build and erect, or build only, overhead sign structures in any size or quantity. Write or phone today.

PLANET CORPORATION

• Traffic & Safety Equipment
• Engineered Handling Systems
• Automation Equipment

1842 SUNSET AVENUE LANSING, MICHIGAN

The first edition of this publication appeared in 1948. It was widely used by traffic engineers and others concerned with parking garages. The new edition discusses changes that have taken place in the past 10 years in the design of garages as well as changes that have occurred in motor vehicles. The book will be extremely popular because it serves to fill a need which is not met by any other publication.

Night Visibility—1957

Bulletin 163. Highway Research Board. 2101 Constitution Ave., Washington 25, D.C. 1957. 32 pp. $0.80.

This bulletin contains four papers sponsored by the Committee on Night Visibility and presented at the 36th Annual Meeting of the Highway Research Board, January 7-11, 1957, as follows:

"Assessment of Nighttime Roadway Visibility," by D. M. Finch and J. D. Palmer, reports a study using a visibility meter to evaluate visibility conditions of two extremes of street lighting; that is, a uniform and an extremely non-uniform roadway brightness pattern.

"Some Night Views of a Highway Lighting Test Installation," by George A. Nagel, presents photographs taken at night on a highway lighting test strip on U.S. 1 in the town of Old Lyme, Conn. Halation, obstacle recognition, and film fogging are discussed.

"A Device for Establishing a Safe Stopping Distance at Night," by Clifford O. Swanson, describes an apparatus designed for use in making a visual demonstration of the principles involved in determination of a safe nighttime driving speed. A discussion by K. A. Stonex and P. C. Skeels calls attention to more recent papers on visibility and stopping distances, and cites a number of other factors which should be considered.

"Visibility of Reflectorized License Plates," by Earl M. Larimer, presents data to establish typical visibility distances of unlighted vehicles, both with and without reflectorized license plates, relative to safe stopping distances.

Strictly Business

Left: Leo Jennings, Vice President and General Manager. Right: Arthur Loomis, President. Econ-O-Lite Corporation.

Econolite Moves Forward; Produces New Controllers

In the accompanying photograph Arthur Loomis, president and Leo Jennings, vice president and general manager of Econolite Corporation, 8900 Bellanca Ave., Los Angeles 45, California, are shown as they admire the first Type "F" Traffic Controller made on Econolite's new production line. This achievement follows closely the recent announcement that Econolite had purchased the extensive and important traffic signal and control business from General Electric's Outdoor Lighting Department, Hendersonville, North Carolina; also that, as soon as plant equipment, tooling, stock, etc., could be moved and integrated with present facilities, manufacturing op-

erations would begin in the Los Angeles area.

The time element involved in this change-over has its importance, in that operations were closed down in North Carolina on September 27th, the cross-country move was completed, machinery re-assembled, tooling and dies set in motion, personnel trained in operating procedures, and the assembly line was again in operation by November 4th. On November 21st, the first completed controller moved off the assembly line.

Production of this Type "F" Controller is most important because traffic signal and control is increasing in complexity as the problems of traffic congestion are magnified on our streets and highways day by day. The Type "F" Controller is universally applicable in the field of pre-timed traffic control. Initially applied to present day needs, this type of controller can be adapted to more complex future problems by the simple addition of dials, units, relays and other accessories.

Econolite has manufactured both vehicle and pedestrian signals of their own design for several years. This, plus the added facilities for manufacturing Type "F" Controllers and equipment locally, will now enable Econolite to more efficiently fulfill the requirements of traffic engineers in the immediate area as well as throughout the country.

Calumet Skyway Signs Made by Federal

More than 300 specially designed reflector and neon illuminated highway signs being made for Chicago's new eight-mile Calumet Skyway have been engineered to help make the overhead toll road the safest and most clearly marked link in the non-stop Chicago to New York turnpike system, according to Federal Sign and Signal Corporation, the manufacturer.

A number of sign advances and modern outdoor visual techniques are incorporated into the program to guide motorists to and through the Skyway, and keep traffic moving smoothly.

To warn motorists before they reach the toll station at 87th street, special yellow neon signs have been constructed which continually flash CAUTION and advise drivers to reduce speed. Brightly illuminated red neon signs, encased in unbreakable plastic and stainless steel, indicate passenger and

When the City of New Orleans dedicated a new "PR" signal system in the CBD, Mayor Chep Morrison presented a key to the city and certificate of merit to Ed Johnson, service manager for 30 years for Automatic Signal. The presentation ceremony is shown above.

WILSHIRE BOULEVARD, LA, GETS NEW LIGHTING

This daytime view of the new Wilshire Boulevard street lighting installation shows General Electric mercury vapor luminaires mounted two to a pole at angles of 45 degrees to the curb. The units are mounted oppositely at intervals of 125 feet and at a height of 32 feet.

Wilshire Boulevard's unique new street lighting installation provides a high level of uniform illumination with a minimum of glare. The vision-engineered system was specially designed to present a modern, physically-attractive installation by day and to provide highly-effective roadway illumination for after-dark motorists.

Federal Sign employees finish work on Calumet Skyway signs.

truck toll lanes, and also several time-saving lanes attended by automatic coin machines. Several of these signs can be switched to read either "attended" or "automatic" lane, to enable toll road authorities to adjust traffic patterns at the pay station.

Dark blue and white highway direction signs at all exits and entrances, made of rugged interlocking aluminum extrusions for durability and strength, employ silver reflective sheeting on all letters, numerals, and borders to provide maximum night and day effectiveness.

To avoid confusion by motorists unfamiliar with the location of the new turnpike link, Federal also is making 200 distinctive trailblazer signs which will be posted on all streets and roads leading to the Skyway's various entrances. The trailblazer emblem, a short, blue arrow inside a white circle, points the way to the Skyway.

With sign engineering, construction, and erection facilities developed during a half century of road and street sign making, Federal has become the nation's leading turnpike sign manufacturer.

The Chicago-headquartered company recently completed a one-million dollar sign construction program for the new Connecticut Toll Road, and also has produced extensive sign programs for turnpikes in Missouri, Kansas, Oklahoma, and Kentucky.

New Fluorescent Outdoor Light Is Offered

Color-corrected illumination is provided by the latest addition to the Kenworth line of outdoor lighting devices.

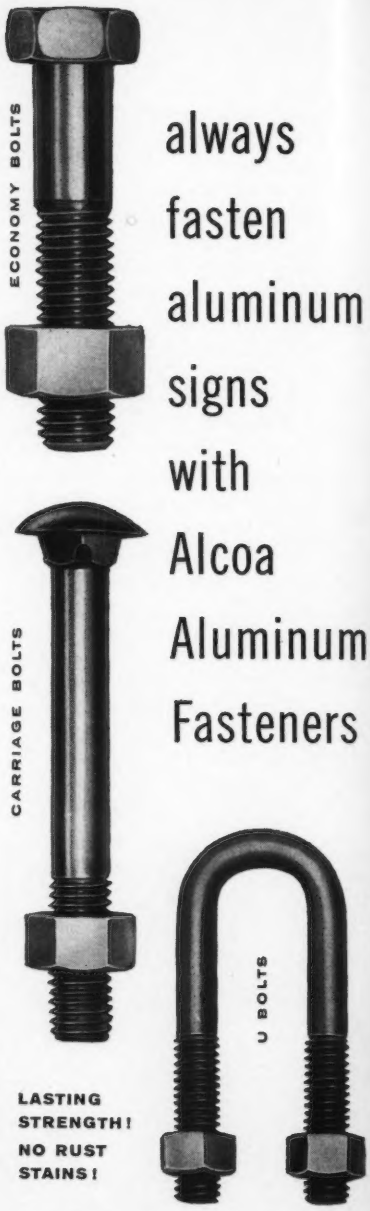
This is the "Circa-Lite" shown here. The new luminaire utilizes standard 40-watt circular fluorescent lamps available everywhere. Up to 8 lamp "modules" can be installed on each pole... simply by plugging the modules into each other. In this way, the light output can be varied from 2500 to 20,000 lumens to meet various lighting requirements. Designed to provide comfortable, color-corrected illumination for most outdoor applications, the Circa-Lite is especially easy to install and to maintain. All component parts are aluminum, including the poles which are high-strength aluminum extrusions, available in mounting heights to 20 feet. Three styles of bases are offered, one of which is hinged so that the luminaire can be serviced from the ground. The unit is manufactured by the Kenworth Company, Winsted 1, Minnesota.

Bergholz Named Eagle Representative For Wisconsin

Ray Bergholz of Milwaukee was named Eagle representative for Wisconsin. This appointment was made to fill the vacancy caused by the recent death of Mr. Harry Bevin, who had

Ray Bergholz

represented Eagle in Wisconsin for a number of years. Mr. Bergholz is President of the Traffic and Parking Control Co. of Milwaukee and has had much traffic control and electrical experience. He was actively engaged in the electrical supply business for more than 10 years prior to forming his own company, specializing in automatic parking gates as well as sign markings and other equipment for the control of traffic.



To stop the rust that stains message films and eats away at holding power, fasten aluminum signs with Alcoa® Aluminum Fasteners. They never rust! There are nuts, bolts and washers for every sign. Call your local Alcoa sales office for details, samples, prices. ALUMINUM COMPANY OF AMERICA, 2235-C Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM FASTENERS
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

It's NEW!
It's FACTUAL!
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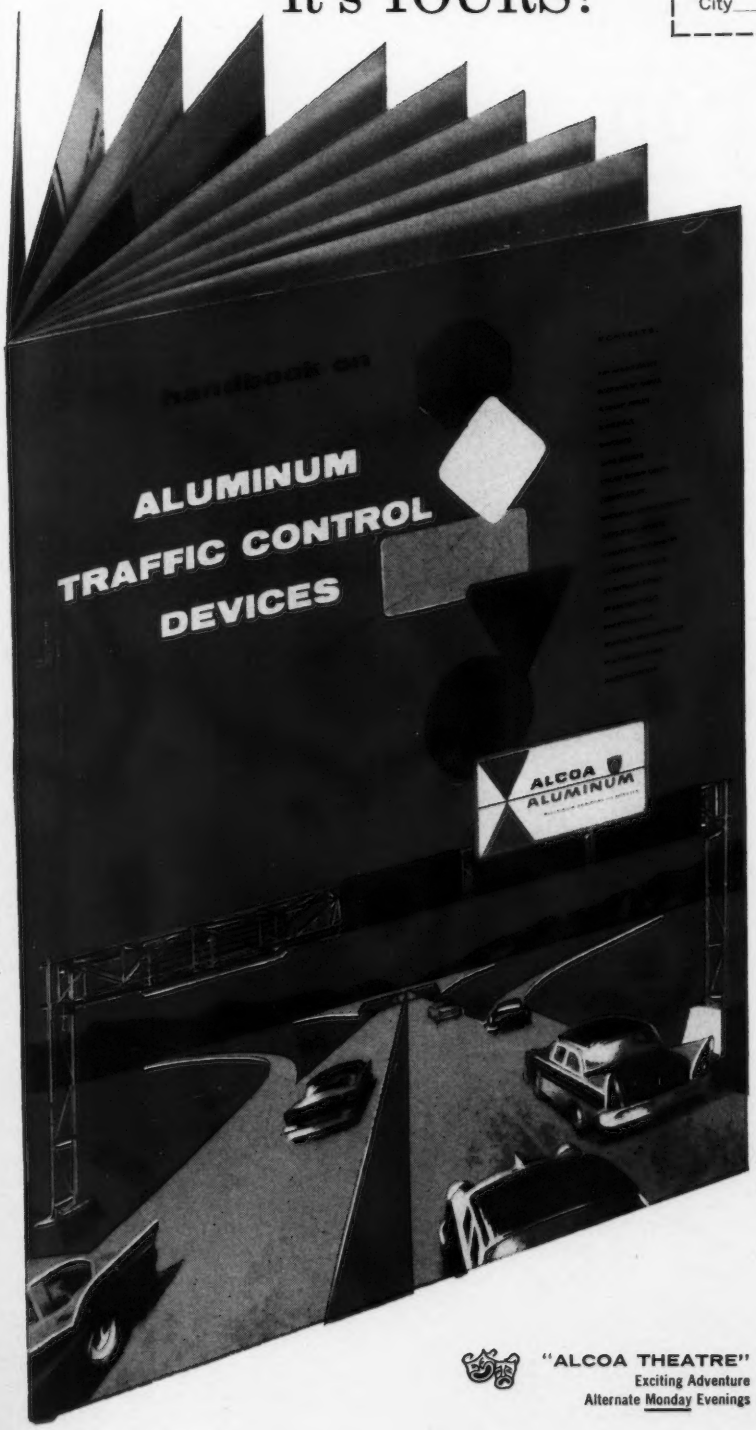

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Exciting Adventure
Alternate Monday Evenings

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Gentlemen: Please send me my free copy of the Alcoa *Handbook on Aluminum Traffic Control Devices.*

Name_____

Title_____

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City_____ Zone____ State_____

Alcoa's 20-page Handbook on Aluminum Traffic Control Devices answers every important question on today's best buys in traffic control.

How do you select proper size aluminum I-beam posts without tedious calculations? How do you save hours of computation and drafting when specifying turnpike signs?

You can get the answers to these and virtually every other question on aluminum traffic devices in a compact bulletin just published by Alcoa. It includes sections on street signs, extruded signs, embossed signs, panel signs, sign blanks, overhead sign structures and structural posts. There is detailed information on ordering and specifying, installation and mounting, surface preparation and fabrication. Short discussions cover processing methods, storage and handling, stripping, aluminum paint and other background material that can help you get more for your traffic control dollar this year.

To get your free copy of this useful handbook, send in the coupon above. And for additional information on how maintenance-free traffic control devices of Alcoa® Aluminum save taxpayers' money, write to Aluminum Company of America, 1682-C Alcoa Building, Pittsburgh 19, Pa.

Your Guide to the Best in Aluminum Value

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ALUMINUM COMPANY OF AMERICA

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SIGN FACES BY GRACE

ATTACHES IN LESS THAN 5 MINUTES!

"EZ-ON" Faces, slip on right over present signs. Your signs are never out of service. Standard regulatory and warning copy—in red and white, yellow and black. They meet every need at ½ the ordinary cost!

2 SIGNS FOR $5.00

SPECIAL OFFER

TRY THEM AND SEE FOR YOURSELF

2 SIZES—2 SHAPES — REFLECTORIZED

"EZ-ON" Faces are made in 24 and 30 in. sizes, octagon and diamond, of light gauge steel, flanged to easily clamp over old signs. Fully reflectorized, they serve night and day meeting all specifications for durability, brilliance and reflective qualities.

SEND IN A TRIAL ORDER

Yes, 2 signs for only $5.00 . . . a special offer. A trial will convince that "EZ-ON" Faces are the answer to traffic sign costs and maintenance.

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ST. LOUIS 18, MO.
Dept. ET

NOW!

a NEW solid-color PVC POLY-CONE*

tough, durable, no seams, will not CRACK, TEAR or BREAK!

This new SAFE-T-CONE never needs repainting. Just wash it with soap or solvents. Made of polyvinyl-chloride to produce the toughest, *most durable cone on the market.* Outlasts ordinary cone many times . . . . without upkeep!

*Polyvinyl-chloride

2191

SAFE-T-CONE® TRAFFIC GUIDES

All-Rubber SAFE-T-CONES available in 3 SIZES!

Painted or Reflectorized ALL RUBBER

Regular all-rubber SAFE-T-CONES, now better than ever. Painted standard red and yellow or reflectorized.

Plastic or All-Rubber FLUORESCENT

New Poly-Cones and All-Rubber cones available in brilliant orange-red fluorescent for extra brilliance, day or night.

SAFE-T-CONES made only by Radiator Specialty Co.
Charlotte, N. C.

Membership Applications

The following applications have been received since the list published in the February issue.

APPLICATIONS FOR TRANSFER

CASS, Samuel
Metropolitan Traffic Engineer, Municipality of Metropolitan Toronto, 171 Eglinton Avenue East, Toronto 12, Ontario, Canada. January 23, 1958 for MEMBER grade.

CLEARWATER, Louis L.
Traffic Engineer, Department of Traffic, Room 1000 City Hall, Los Angeles, California. January 13, 1958 for ASSOCIATE grade.

DODGE, Eric D.
Transportation Economist, Tippetts - Abbett - McCarthy - Stratton, 62 West 47th Street, New York 36, New York. January 8, 1958 for ASSOCIATE grade.

THOLBORN, George F.
Assistant District Traffic Engineer, California Dept. of Public Works, Division of Highways, District X, 1976 East Charter Way, Stockton, California. February 10, 1958 for ASSOCIATE grade.

NEW APPLICATIONS

BLOMME, George W.
Traffic Engineer, De Leuw, Cather & Company, 150 North Wacker Drive, Chicago 6, Illinois. February 3, 1958 for JUNIOR grade.

CRANE, Herbert L.
Traffic Engineer II, Michigan State Highway Department, 17405 Lahser Road, Detroit 19, Michigan. January 15, 1958 for JUNIOR grade.

EICHELBERG, Kenneth C.
Traffic Control Sales Manager, Crouse-Hinds Company, Wolf & Seventh North Streets, Syracuse, New York. February 10, 1958 for ASSOCIATE grade.

GASSMAN, Lawrence
District 10 Access Permit Engineer, Illinois Division of Highways, 160 North LaSalle Street, Chicago 1, Illinois. January 31, 1958 for JUNIOR grade.

HEAD, Raymond S.
Associate Highway Engineer, California Division of Highways, 150 Oak Street, San Francisco, California. January 20, 1958 for ASSOCIATE grade.

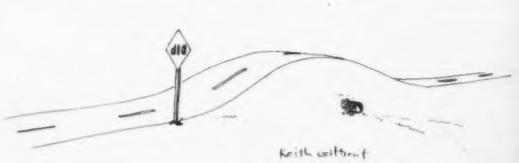
MARASOVICH, George T.
Traffic Engineer II, Bureau of Street Traffic, 321 North LaSalle Street, Chicago, Illinois. January 14, 1958 for JUNIOR grade.

PULLIAM, Kenneth P.
Inspector at Large, W.Va. State Road Commission, 1800 Washington Street East, Charleston 5, West Virginia. February 5, 1958 for JUNIOR grade.

RAMIREZ-CARRIL, Ramiro
Chief, Traffic Engineering Division, Department of Public Works, Santurce, Puerto Rico. January 20, 1958 for MEMBER grade.

ROBERTSON, James B.
Associate Traffic Engineer, Public Works Department, City Hall, Richmond, California. January 8, 1958 for JUNIOR grade.

WECKESSER, Paul M.
Senior Traffic Engineer, Bureau of Traffic Control (City), 6 University Avenue, Rochester, New York. January 17, 1958 for JUNIOR grade.



Section News

METROPOLITAN (N.Y.) SECTION

Minutes December 4th Meeting

Twenty-eight members and guests attended the luncheon meeting at the Masonic Club. Mr. William Rusch, Staff Director, National Committee on Urban Transportation, who was to be the speaker was unable to attend because of transportation difficulties resulting from a severe snowstorm.

Gordon Gravelle, Secretary of the Sub-Committee on Standards for Street Services and Facilities of the National Committee on Urban Transportation, substituted for Mr. Rusch and told of the work and plans of the National Committee.

Electronic Driver

This past October RCA and the Nebraska Department of Roads demonstrated an electronic system for vehicle control.

The system unveiled in Lincoln is basically a series of electronic elements buried in and along the highway pavement to detect and respond to the passage of vehicles. The uses demonstrated in the field included devices advising a driver when he followed too closely behind another vehicle or the presence of an obstacle in the roadway ahead. In one demonstration, the windshields of a vehicle were covered and the driver was guided along the center of the lane by a meter on the dashboard.

Thruway Opens More Sections

The final 29 miles of the Erie Section of the New York State Thruway, from Silver Creek to Buffalo, was opened to traffic on December 16th.

Completion of the entire 70 mile Erie Section boosts the operating mileage on the Thruway to 506, making it the World's longest toll expressway.

Number Seven for the Dept. of Traffic

On December 2nd, the Department of Traffic opened their 7th off-street parking facility.

The most recent addition was the 73 car lot at 29th Street and Hoyt Avenue in Astoria, Queens.

Art Kane is the Director of the Department's Off-Street Parking Division.

MEMBER NEWS

Joins N. J. Bureau

Stephen G. Petersen joined the N. J. Bureau of Traffic Safety as a Senior Traffic Engineer this past June following his completion of the course at Yale.

Steve, a Graduate of R.P.I., worked for a Boston Consultant prior to entering Yale.

Promotions

Bob Williford, formerly a Traffic Engineer 2 in the Operation Services Dept. of the Port Authority has recently been promoted to Assistant Manager of the Tunnel And Bridges Department.

Also, *Tony Galioto* has been promoted to a Traffic Engineer 2 in Operation Services.

An Old Friend

Bob Keith who left us last year for Washington, D.C. writes that he recently bought a home in Maryland and is a proud father for a third time. Latest addition was a boy.

Word has it that Bob and *Dave Baldwin* are neighbors so Bob stays abreast of the Section's doings through Dave.

Congratulations

Ruth and *George Wickstrom,* of the Department of Traffic, proudly announce the birth of their second daughter Gail Victoria. Gail entered this world on December 5, at 8 lb. 5 oz.

MICHIGAN SECTION

The January meeting was held in Flint.

Howard Bauerle outlined the program arranged for the Michigan Safety Conference in Detroit in April. Theme of the Conference will be developing public support for traffic control devices and operational plans.

Mr. Shipman of the State Safety Commission asked in a letter for help in encouraging high school graduates to pursue engineering careers generally and specifically traffic engineering.

Frank Ronan was asked to arrange for a speaker from the Detroit Engineering Society to speak on that group's student guidance activity at the next meeting of the Section.

MIDWEST SECTION

The annual business meeting of the Midwest Section was held on December 12, 1957. Thirty-two members and their guests were present to hear President *George Hagenauer's* farewell address. The report of the president was very well received by all present and characterized President Hagenauer's popular reign. New President *John Zimmerman* was then introduced and formally presided over the remainder of the meeting.

The formal installation of officers took place at the 8th Annual Ladies' Night Dinner Dance held at the Conrad Hilton Hotel on January 25th; Toastmaster *Les Sorenson* presided over the festivities. Other officers besides the new President introduced to the gathering of over 100 ITE members and guests were Vice President *Albert Forde* and Secretary *Gordon Lindquist,* as well as Board of Direction members *Wayne Volk, Charles Michalski* and *Walter L. Jolesch.* Outgoing President *George Hagenauer* is also a Member of the Board.

In retrospect 1957 was an auspicious year for most Midwest ITE'rs. To our knowledge not one local section member was imprisoned, hung, dishonorably discharged from Civilian Defense, exiled to Duck Island, or even demoted. In fact many gained positions of importance and dignity. Included in this group were: *Les Sorenson,* new Deputy Commissioner of Streets and Sanitation; *Matt Sielski,* Director for the Illinois Highway Users Conference; *Phil Linscott,* Manager of DeLeuw's San Francisco office; *Jim Hunnicutt,* Director of Parking for Nashville, Tennessee; and last, but not least, *John Nagel,* Chairman of the Traffic Subcommittee of the Chicago Metropolitan Area Highway Design Committee.

There have also been several noteworthy changes in the general demeanor of certain of the ITE'rs during this past year. Ex-President *Hagenauer,* for example, has been relaxing recently by listening to Mau-Mau Hi-Fi recordings. This is as nothing though compared to *Bob Nau's* hobby, i.e., pulling aldermen's chestnuts out of fires and substituting his own imported Havana's therefore. *Tony Kanz,* Rockford's T.E. and bon vivant is also a changed man—nuff said!

Probably the biggest change in any section member has taken place in *Charley McLean* since the American of January 12 appeared. He now refers to himself as the Mickey Hargitay of ITE.

Ed Note: The reference to Charley McLean is in reality a reference to *Mrs.* McLean (Jun. Mem., ITE), whose picture graced the pages of a nationally-distributed Sunday supplement. It was a nice story, and a good picture of a pretty gal.

SOUTHERN SECTION

The Section's Nominating Committee, composed of *Paul Ristroph* (Chairman), *Art White, Karl Bevins, Bob Burch,* and *Earl Reeder,* has proposed the following slate for 1958:

For President—*Fenton G. Jordan, Jr.*
For Vice-President—*William S. Derrick*
For Sec'y-Treasurer—*John T. Hanna*

The Annual Meeting of the Section is scheduled for Memphis during the Southern Safety Conference. A program has been planned by a committee of Marble Hensley (Chairman), Karl Bevins and O. K. Anderson.

WESTERN SECTION

San Diego Area

Ed Hall announces that the City of San Diego Advance Transportation Planning Team has been upgraded from Assistant to Associate level as a result of a recent study of the responsibilities of these positions. The Advance Transportation Planning Team consists of a full-time representative from City Planning, City Highway Design, and City Traffic Engineering. The County of San Diego also has two members on this team, one representing the County Planning Department, and the other the County Surveyor's Department for Highway Design.

Among several recent innovations in the County Road Department, *Paul Fowler* reports the introduction of radar signal detectors in this area. Delays in scheduling a budgeted major reconstruction project have forced installation of a temporary traffic actuated signal having maximum salvage value. Paul says he's "resting up" (as usual) in anticipation of at least a normal amount of growing pains involved in their operation.

Traffic census data has now joined the Accident Report data on IBM punch cards in the Road Department. *Ben Dobbins* takes credit for the design of the punch card and the printed tabular form, both of which can be expanded to cover a ten-year period. The new system provides a handier reference and affords increased reproduction and distribution of the census data.

Paul Fowler reports that the County of San Diego is planning to use aerial photographs to study 12 intersections in relation to accident analysis, channelization, necessary berms or curbs, and turning prohibitions. Paul sounds very enthusiastic about the program and hopes that more intersections can be studied by this method.

Oregon Area

Oregon's Manual on "Uniform Traffic Control Devices for Streets and Highways" was released for distribution this past month. This is a 360-page publication containing the official standards for the design

How optically flat reflective sheeting keeps entire sign visible in any weather

With the ever-growing volume of travel on our highways, it is increasingly important that traffic signs function at their highest level at all times . . . especially at night and in bad weather when the need for visibility is greatest.

Nighttime visibility of traffic signs through reflectivity has been an accepted fact for quite some time. But weather remains an enemy of most traffic signs . . . even reflective ones. That conditions of rain, snow, fog and the like curtail visibility is no secret. The "fair weather" sign, even under such conditions as a heavy dew, loses as much as 95% of its reflective quality.

Optically flat "Scotchlite" Reflective Sheeting, however, stands out in any weather. This is the sign material whose reflective elements are completely protected by a durable coating that not only guards the sign surface, but minimizes the distortion effects of weather.

No blackout in water

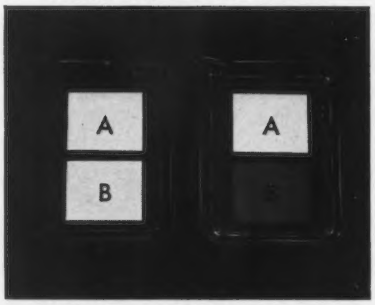


Fig. 1. The pan on the left holds two reflective samples. "A" is optically flat "Scotchlite" Sheeting; "B" is an exposed lens material. When dry, both reflect. In the pan on the right, one inch of water covers both samples. While "Scotchlite" Sheeting loses little of its designed reflectivity, sample "B," with its optical characteristics changed, "blacks out."

"Scotchlite" Reflective Sheeting, as you may know, is a reflex-reflector. It directs collected light from an approaching auto headlight right back to its source. An entire sign of this material reflects the full message of that sign—the true shape, color and legend. Because of the optically flat surface of the sign its designed reflective characteristics are retained with a *minimum* loss of efficiency and performance in a heavy rainfall. Motorists can still see the entire sign clearly.

Where reflective elements are exposed, however, water fills in and alters the optical focus, causing a severe loss in reflection. The photo in Fig. 1 demonstrates this point.

Shown are two pieces of reflective material. That labelled "A" is optically flat "Scotchlite" Sheeting. "B" is exposed lens sign material. In the first picture, both are dry, both reflective. In the second, both have been placed *under water*. You can see how the sample of "Scotchlite" Sheeting continues to reflect to a high degree while the other, sample B, has blacked out. Here is positive proof that optically flat "Scotchlite" Sheeting succeeds in communicating when exposed lens systems fail.

All-weather performance

Because of its high brightness and optically flat construction, a sign of "Scotchlite" Reflective Sheeting gives the best possible performance in rain, snow, dew, etc. It is the best answer man has yet devised against the enemy—weather.

Most effective sign material

Performance in any weather, of course, is just one measurement of an effective traffic sign. There are others that you may be interested in even more. For instance, ease of fabrication and maintenance, durability, economy. The most effective sign material for you is the material that offers the best performance and durability characteristics at the lowest overall dollar cost. Only precision-made "Scotchlite" Reflective Sheeting meets these requirements so well.

Your 3M Representative will be happy to demonstrate any or all of these points to you. See him soon.

On the highway, motorists see the full shape, color and legend of a sign of "Scotchlite" Sheeting. Optically flat surface, with its reflective elements protected from the weather, remains distortion-free even during heavy rain. The sign cannot "black out."

Or for more data on effective, durable all-weather signs of "Scotchlite" Sheeting, write: 3M Company, Dept. GS-38, St. Paul 6, Minn.

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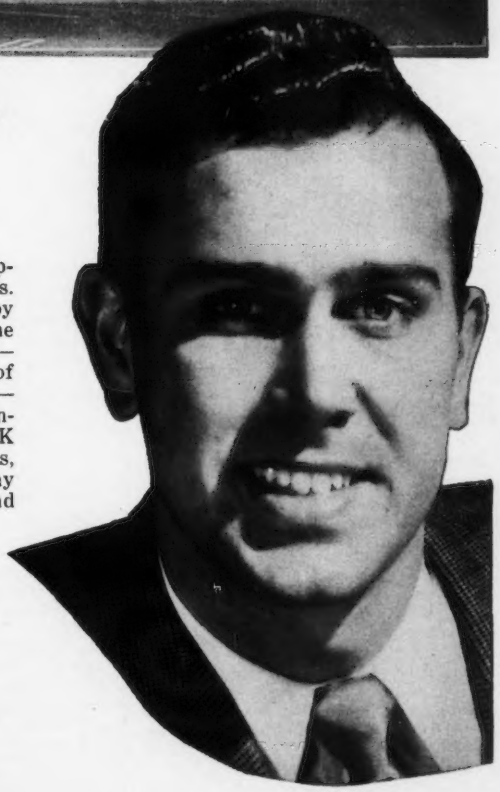
make the job easier!

To complement the modern architectural style, the Westlake Shopping Center, Westlake, California, chose P & K lighting standards. Why not? They obtained the desired quality of lighting and, by having the entire unit supplied by one reliable source, they made the job so much easier. With so many P & K groupings to choose from—davit or straight standards or more artful shapes—and a choice of three light sources, incandescent, fluorescent, or mercury vapor—Westlake, in effect, customized their installation with standard components. Needless to say, they enjoy all the advantages of P & K aluminum lighting standards, for, in addition to their good looks, they offer easy installation, no maintenance. Before you specify any lighting standards check the P & K catalog first. For your copy send for Catalog L-2.



WESTLAKE PREFERRED THE P & K 32-FOOT DAVIT STYLE STANDARD

whose sweeping, tapered lines are in perfect harmony with the surroundings. The luminaire itself is the P & K LUXaire—a weather tight fluorescent fixture that allows for convenient lateral adjustment and easy relamping. The four flourescent tubes of this six-foot model provide 21,000 lumens. Other LUXaire's from 2 to 8 foot provide from 6,000 to 40,000 lumens.

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and use of traffic control devices on all public ways in the state. Copies are available for $5.00 each upon request to the Oregon State Highway Department, Traffic Engineering Division.

Bill Weller is recovering nicely from his recent illness, and it is a pleasure to report that he expects to return to work on a part-time basis.

Congratulations to *Glen* and Cleo *Clark* on the arrival of a baby girl named Cynthia Ann. The Clark's have one other child, a son Terry.

Arizona-New Mexico Area

Phoenix removed the "Scramble System" from three downtown trial intersections December 2 on a permanent removal basis. "Scramble" was tried in Phoenix for approximately 8 months and was removed because of the reduction in capacity when using the "Scramble System."

Inter-Mountain Area

A major one-way street system was installed in Denver on December 8th, which made Speer Boulevard a major arterial in Denver, one-way on both sides of Cherry Creek for some distance. This gives a major traffic-way from the Southeast into downtown Denver, with four lanes of one-way traffic on both sides of Cherry Creek. *Jim Brown* performed a magnificent job in respect to signal timing in this difficult area, and *Jack Bruce* believes the new one-way streets along Cherry Creek are among the most successful that they have ever placed in operation. Certainly, it is a tremendous improvement and it has been wholeheartedly accepted by the driving public.

Bob O'Connell is trying to convince the Wyoming drivers that a white center line is much better, safer, and cheaper than the yellow center line, which was required in the past by legislative action. The law requiring the yellow center line was repealed 1½ years ago, and now the Wyoming Highway Commission has adopted the national recommendation of a white center line with a yellow barrier. Once again the demands are coming in to return to the yellow center line. Bob is putting out an urgent request to anyone that might have made a study regarding the color code, to help him out. If any of you WesternITE traffic engineers have made such a study, please contact Robert C. O'Connell, Planning & Traffic Engineer, Wyoming Highway Department, New State Office Building, Cheyenne, Wyoming.

Allan R. Pepper reports that he is extremely pleased by again being honored with appointment to the ITE Resolutions Committee. Combining this with his Chairmanship of the Western Section Resolutions Committee he promises to make every effort to see that indirectly every member of the Western Section will have a chance to express his views on Resolution material both national and western in scope.

The U.S. Air Force Academy opened the main interchange entrance this week. This affords the Colorado Department of Highways its first opportunity to install maximum signing using interstate standards. Al has been wondering if this interchange will some day carry traffic bound for one of the interservice football clashes.

Denver presently has a study under way and after the first of the year will post a great number of Tow-Away signs. This procedure, of course, has been utilized in many West Coast cities, but Denver is just starting with the program which will tow illegally parked cars from its restricted areas downtown and important lead-in streets to the downtown area.

Cheyenne is formulating a program for street name markings. The plans call for a two-corner installation of green and white scotchlite street names. The existing signs are quite obsolete, but it will take considerable time to revamp some four-thousand intersections.

Al Pepper has begun to worry again as he was prior to the Western Section June meeting in Denver, since he has been asked to give a paper at the U. of Colorado Highway Engineering Conference to be held early next year on the subject of "Traffic Controls and Signs for the Interstate Highway System." Perhaps some of you will recall that he received the AASHO Committee Report just a couple of days ahead of the June meeting and was able to actually give a "first" as far as this part of the country. Now it appears that the final policy will be coming out just about the time of the Boulder Conference so he is worrying all over again. Al says what would traffic engineering do without deadlines, but wouldn't it be nice sometime to prepare a report without fearing that it would be antiquated before it is compiled. Oh well, "Everything is moving too fast."

The State and City joined forces recently with *Al Pepper* and *Jack Bruce* serving as adult consultants to the 1957 Colorado Teen-Age Safety Conference. Al and Jack were asked to guide the discussion of a panel titled "Traffic Control." Believe it or not, these two gentlemen finally decided that they had met their match with these Teen-Agers, including both the young men and the young women. They agreed that it was much easier to answer questions from adults, since the Teen-Agers were satisfied only with one answer—the correct answer. It was useless to try any hedge-hopping. As a result, the engineering recommendations coming out of the Conference put it squarely up to the traffic engineer to among other things, "end the confusion" by giving out fewer, but larger, signs; better advance warning of hazardous locations; uniform signal installations; work closer with the automotive design engineers particularly with regard to safety features incorporated in new vehicles. If the tempo of this Teen-Age Safety Conference is any criteria for judgment, boys, you had better go back to your text books and brush up as our scientific youth wants to know "why and wherefor."

Bay Area

Almost 30 members of the Bay Area Section attended a work shop luncheon in San Francisco on December 4. Bay Area policy concerning the status of existing "No U Turn" signs at signalized intersections was discussed, in view of the new legislation. The new policy was adopted that existing signs would be removed. Other topics discussed included policy for signing double turns and the use of "Right Turn Permitted on Red" signs. The idea of work shop luncheon's was well received and more will be scheduled in the future.

Ralph Moyer is recovering from his recent illness and is back in his office part time. He has been relieved of his teaching duties during the current semester, but will take up the reins again in the spring.

FLASH! *Distinguished honor for the Western Section:*

At its January meeting, the Highway Research Board announced that the "Freeway Capacity Study" by *George Webb* and *Karl Moskowitz* received the award of best highway paper presented during 1957. All members can be extremely proud of these two fine Western Section members.

OBITUARIES

Farley Gannett

Farley Gannett, 77, died suddenly in Washington on January 20 during the meeting of the American Road Builders Association.

Mr. Gannett lived for many years in Harrisburg, Pa., where he was chairman of the Board of Gannett, Fleming, Corddry and Carpenter, well-known consulting engineers. This firm designed portions of the Pennsylvania Turnpike and many highways in other states.

Mr. Gannett was one of the early Presidents of the Engineers Society of Pennsylvania and was a member of the Pennsylvania Society of Professional Engineers, American Society of Civil Engineers, American Water Works Assoc., and American Road Builders Association.

Frederick J. Eckhardt

Frederick J. Eckhardt, an Associate Member of the Institute, died in New York City January 28 after a short illness. He was 52 years old, and at the time of his death was director of traffic services for the New York City Department of Traffic.

Born in Brooklyn and educated in the Brooklyn schools, Eckhardt was engaged in various engineering work for over thirty years. For the last nine years he was associated with the Department of Traffic.

YALE STUDENT CHAPTER

Officers for the second semester are:
Robert J. Dodge—President
Deane M. Wenger—Vice President
John F. May—Secretary
Neil S. Guerin—Treasurer

U. of ILLINOIS STUDENT CHAPTER

—Letter from George Malina, Sec-Treas.

Twenty-eight members and guests were present at a meeting of the Illinois Student Chapter on December 19. The attendance was especially noteworthy because this was a rainy night just before the Christmas vacation.

President *Karmeier* called the meeting to order, and Vice President *Guthrie* introduced the speaker, Mr. John Manikas of the Ford Motor Company. He spoke on the topic, "The Automotive Industry and Traffic Safety," and showed two films, one on crash research and the other on driver education.

A business session followed which featured discussion of the study of a problem intersection on the campus.

Reference Notes

BIG DIVIDENDS FROM ONE-WAY STREETS

by W. H. Mann
(Mem., ITE)
City Traffic Engineer, Nashville, Tennessee

It is well known that the use of streets for one-way traffic increases their capacity appreciably over the same streets used for two-way traffic. But in the case described here, the capacity of a two-way arterial at right angles to, and connecting the ends of a one-way pair, was increased 60 to 70 per cent by extending the one-way pair two blocks on the other side of the arterial.

The diagram shows the circulation arrangement before and after the change. The total change consisted of making McGavock Street one way westward from 8th Avenue to 10th Avenue; Demonbreun Street one way eastward from 10th Avenue to 8th Avenue; and the addition of a traffic signal at 8th Avenue and Clark Place.

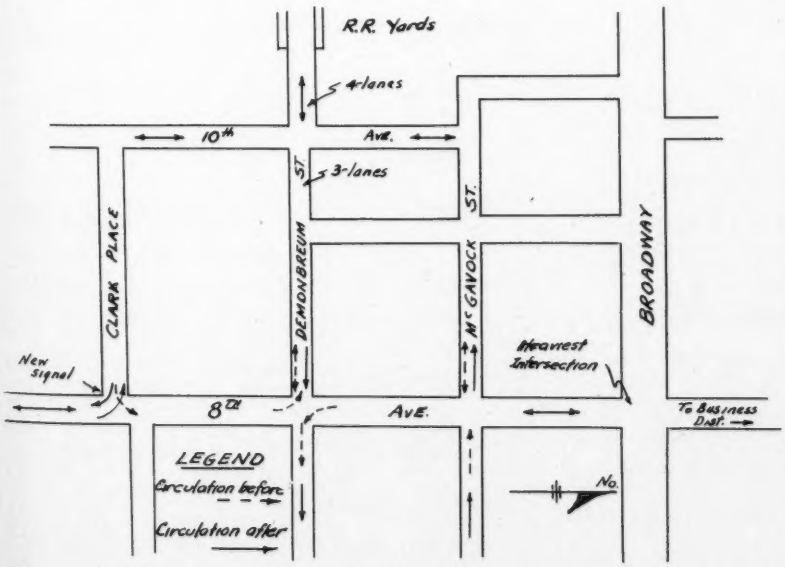
The three lanes of Demonbreun Street between 8th Avenue and 10th Avenue had been used with two lanes eastbound and one lane westbound. West of 10th Avenue, Demonbreun Street is four lanes wide across a railroad viaduct with two lanes in each direction. Because street capacity across the railroad is limited, much traffic from the east on McGavock Street and from north and south on 8th Avenue wanted to use the single lane westward from 8th Avenue. The signal at 8th Avenue and Demonbreun Street had a third phase permitting a left turn off of 8th Avenue into Demonbreun Street. The split on this signal was: for left turns 12 seconds; for each through phase 24 seconds, making a 60-second cycle.

Traffic on 8th Avenue north of Demonbreun Street was severely congested every evening rush hour with cars backed up into 8th Avenue and Broadway, the heaviest volume intersection in town. Not infrequently back-up due to 8th Avenue and Demonbreun extended six to seven blocks into the heart of town.

By extending the one way pair, Demonbreun and McGavock Streets, from 8th Avenue to 10th Avenue, we automatically made it necessary for traffic from the east on McGavock and from the north on 8th Avenue to go west on McGavock Street to 10th Avenue in order to reach the viaduct. Traffic from the south which had been turning west through Demonbreun Street could no longer do so, hence it turned west in Clark Place to reach 10th Avenue and the viaduct. This left turn off of 8th Avenue into Clark Place was expedited by a two-phase signal.

The capacity of 8th Avenue at Demonbreun Street was increased 50 percent by putting the 12 seconds which had been used for the left turn all into the 8th Avenue through phase. Time for Demonbreun Street was cut because three lanes became available for the same traffic which had been using two lanes. Several seconds were taken off of Demonbreun Street green and put into 8th Avenue. Total increase in capacity of 8th Avenue at Demonbreun Street is easily 60 to 70 per cent. Further benefit was gained by actually decreasing the volume on 8th Avenue at Demonbreun by the number of cars turning off to go west into Clark Place and McGavock Street.

The change in one-way streets was made in March, 1953. Congestion, to which the intersection at 8th Avenue and Demonbreun Street was the key, ceased immediately and there has been no back-up from this intersection since, although traffic volumes increased from January 1, 1953 to January 1, 1957 by over 35 per cent.



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The Institute is considering the possibility of offering a binder (imitation leather, no holes to punch, stamped in gold) to hold 12 issues of Traffic Engineering, at a cost of about $2.50 each.

Are you interested? If enough members and subscribers are interested, the project can be started soon.

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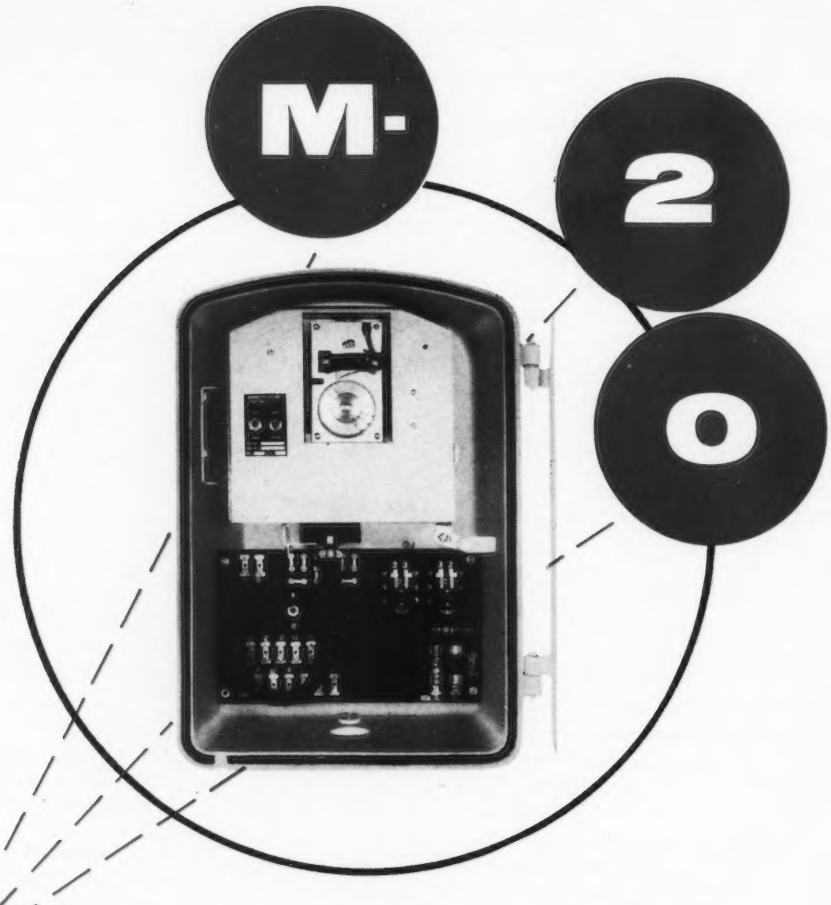

WHAT'S AROUND THE CORNER?

With Traffic Control problems, it's hard to tell. Quick-changing patterns demand overnight changes in control.

That's where the versatile M-20 proves itself. This Single-Dial Controller is really adaptable to the changes that are bound to come.

The M-20 offers:

- Simplified set-up as a master secondary for control of an intersection, and other secondary controllers in the system.
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- Remote Control of flashing, emergency all-red, or signal shutdown . . . for non-interconnected and interconnected systems.
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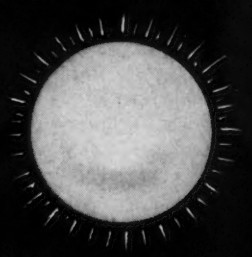

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LONG RANGE VISIBILITY — Good target—complete angularity means better visibility and unequaled legibility up to the point of passing.

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Available in all standard sizes for Traffic Signs, and "extra-fine" grade for Street Name Signs and License Plates.

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NEW RADAR DETECTOR CHECK METHOD SAVES MONEY

The latest device being used by the Traffic Division of the State of Washington, Department of Highways is an automobile-mounted assembly of equipment used to make the required FCC radio frequency check of all radar units being used as traffic signal detectors.

Until now, the normal procedure had been to send a ladder truck out to each installation, exchange the radar detectors, bringing the dismounted units into the shop for the frequency check. This was both a costly and time-consuming operation. The new method, illustrated in the accompanying photographs, involves the use of a properly equipped car and a few-second test sequence within each radar field.

There are three components that comprise the unit. First is the car-top radar antenna (Figure 1). This component contains an antenna identical to that in an RD-1 detector. It is housed in a modified RD-1 housing. Second is the frequency meter (Figure 2). Since the required frequency is in the range of 2445 to 2465 megacycles, a meter of that range only was used to facilitate a maximum degree of accuracy in readings. The third component is a microameter with a range of 0 to 50 microamperes. Oddly enough, no external power source is used for any component as the unit receives all of its power from the radar field being measured.

Figure 1
View showing modified antenna housing with car-top mounting.

Figure 2
Inventor Odion recording field strength data.

Figure 3
Radar detector being checked at Midlakes Interchange near Bellevue.

All radar units are set to a frequency of 2455 megacycles in the shop before installation, and checked after installation by use of the mobile unit (Figure 3). As a part of the after installation check, the output or field strength is measured and recorded. Normally with a 17-foot mounting height this reading will be about 15 microamperes with a frequency of exactly 2455 megacycles. From that time on a permanent record is kept for each radar indicating both field strength and frequency.

Thereafter, a periodic check is made to conform with the FCC ruling concerning frequency checks. With the information obtained, failure of the detector can be anticipated by drift in frequency or weak field strength, and service of it made prior to any malfunction of the control. In addition to better service to the travelling public, the reduced cost element in this new method is of major consequence. Using the old method of bringing each detector into the district shop for measurement, the best that could be done was two or three intersections serviced in a day. This service involved the time of a field crew, ladder truck and a shop technician. The new method requires only one technician in an equipped car with the only limit of work per day being about 10 minutes per intersection served together with the driving time between intersections.

The credit for developing this unique time-saving piece of equipment, known locally as "the Sputnik Detector," goes to Mr. Richard Odion of the Seattle District Traffic Division.

If further information on this piece of equipment is desired, please contact Mr. W. R. Curry, District Traffic Engineer, Washington Department of Highways, 6431 Corson Avenue, Seattle 8, Washington.

Positions Available

HIGH POINT, N.C.

Position: Traffic Engineer.
Requirements: Civil Engineer with an undergraduate degree and specialized graduate training in traffic engineering or equivalent experience.
Salary: Maximum of $550 per month, depending upon qualifications.
Apply: Robert M. Griffin, Jr., Director of Planning, City of High Point, North Carolina.

MONTGOMERY COUNTY, MD.

Position: Traffic Engineer, responsible to Director of Public Works in Maryland county immediately adjacent to Washington, D.C.
Requirements: Civil engineering graduate, with special graduate training in traffic engineering, and three years of engineering experience, two of which have been in traffic, or an appropriate combination of training and experience.
Salary: $7116 to $10,788.
Apply: Personnel Assistant to County Manager, Room 605 County Office Building, Rockville, Md.

SCHENECTADY, NEW YORK

Position: Traffic Engineer (to head Bureau of Traffic in Department of Engineering and Public Works).
Requirements: Engineering graduate, preferably with specialization in traffic, and two years of experience in traffic work.
Salary: $7500 to $9000, with valuable fringe benefits.
Apply: John W. Nagle, City Engineer, City Hall, Schenectady, New York.

TRENTON, NEW JERSEY

Position: Principal Engineer, Traffic.
Requirements: Engineering graduate with some experience in Traffic Engineering work. A competitive examination will be conducted by the New Jersey Civil Service Commission. Closing date for applications is March 31, 1958.
Salary: $6420 to $7620, with liberal pension and life insurance plan.
Apply: New Jersey Civil Service Commission, State House, Trenton, N. J. Details of duties and working conditions available from Otto P. Ortlieb, Traffic Engineer, City Hall, Trenton, N. J.

THE PORT OF NEW YORK AUTHORITY

Position: Highway Project Planner. Assists in planning and development of major highway projects in the New Jersey-New York metropolitan area in which the Port Authority is primarily concerned.
Requirements: Graduate civil engineer with a major in highway or traffic engineering. In addition should have at least three years experience in engineering work of which at least two years should be in highway or traffic engineering. Completion of graduate course in highway or traffic engineering may be substituted for one year of required experience.
Salary: Up to $7,000 depending on qualifications.
Apply: Send resumé to Personnel Department, The Port of New York Authority, 111 Eighth Avenue, New York 11, N.Y.

(Continued from page 28)

Northwestern University Announces Fellowships

Several fellowships for graduate study in transportation areas in civil engineering for 1958-59 are available at Northwestern University Transportation Center. The fellowships range from $1800 to $3000 per year, and recipients can devote full time to their academic programs.

Inquiries should be addressed to Robert B. Banks, Chairman, Department of Civil Engineering, The Technological Institute, Northwestern University, Evanston, Illinois.

Coming Events

March 17-19 — WESTERN SAFETY CONGRESS & EXHIBITS —
9th Annual Meeting, Ambassador Hotel, Los Angeles, Calif. Contact: Joseph M. Kaplan, 3388 W. 8th Street, Los Angeles 5, Calif.

March 23-29—AMERICAN CONGRESS ON SURVEYING & MAPPING—AMERICAN SOCIETY OF PHOTOGRAMMETRY—
Consecutive Meetings & Exhibit, Shoreham Hotel, Washington, D.C. Contact: ACSM-ASP, 1515 Massachusetts Ave. N.W., Washington 5, D.C.

April 14 - 17 — GREATER NEW YORK SAFETY COUNCIL CONVENTION —
Statler Hotel, New York, N. Y. Contact: Greater N. Y. Safety Council, 60 E. 42nd St., N.Y.C.

May 18-22—AMERICAN SOCIETY OF PLANNING OFFICIALS—
Annual Conference, Hotel Statler, Washington, D.C. Contact: Dennis O'Harrow, ASPO, 1313 E. 60th St., Chicago 37, Ill.

August 17-22 — ILLUMINATING ENGINEERING SOCIETY—
National Technical Conference, Toronto, Ont. Contact: IES, 1860 Broadway, N. Y. 23, N.Y.

September 14-19 — AMERICAN ASSOCIATION OF MOTOR VEHICLE ADMINISTRATORS —
Annual Meeting, Fairmount Hotel, San Francisco, Calif. Contact: AAMVA, 912 Barr Bldg., Washington 6, D.C.

September 16-20 — FOURTH INTERNATIONAL STUDY WEEK IN TRAFFIC ENGINEERING—
Copenhagen, Denmark. Contact: World Touring and Automobile Organization, 32 Chesham Place, London, SW1, England.

September 28 - October 1 — AMERICAN PUBLIC WORKS ASSOCIATION—
Muehlebach Hotel, Kansas City, Mo. Contact: APWA, 1313 E. 60th St., Chicago, Ill.

October 13 - 15 — AMERICAN TRANSIT ASSOCIATION—
Roosevelt Hotel, New Orleans, La. Contact: ATA, 292 Madison Ave., N.Y.C.

October 13 - 17 — AMERICAN SOCIETY OF CIVIL ENGINEERS—
National Convention, Statler Hotel, New York City. Contact: ASCE, 29 W. 39th St., N.Y.C.

October 20-23 — INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION—
Sheraton Hotel, Philadelphia, Pa. Contact: IMSA, 130 W. 42nd St., N.Y.C.

October 20-24—NATIONAL SAFETY CONGRESS
Conrad Hilton, Congress and other hotels, Chicago, Ill. Contact: NSC, 425 N. Michigan Ave., Chicago 11, Ill.

November 10 - 14 — INSTITUTE OF TRAFFIC ENGINEERS—
28th Annual Meeting, Deauville Hotel, Miami Beach, Florida. Contact: ITE, 2029 K St.,NW, Washington 6, D.C.

November 28-December 5—AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS—
Annual Meeting, Sheraton-Palace Hotel, San Francisco, Calif. Contact: AASHO, National Press Bldg., Washington 4, D.C.

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MOTOR VEHICLE DEATHS AND DEATH RATES

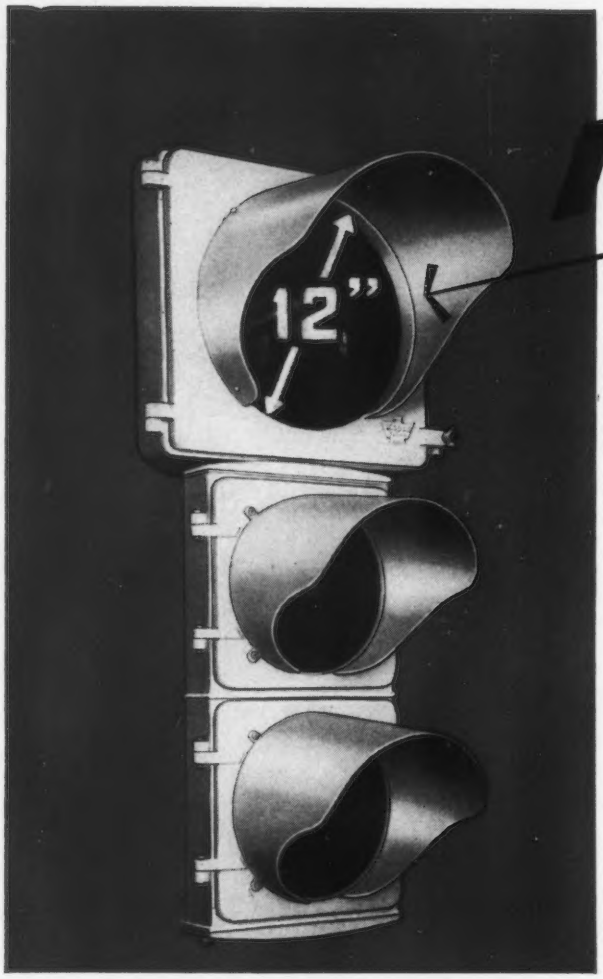
1955, 1956 and 1957

Month	1955	1956	1957	1955-57 Change	1956-57 Change
January	2,810	2,954	2,870	+ 2%	—3%
February	2,319	2,652	2,470	+ 7%	—7%
March	2,602	2,940	2,880	+11%	—2%
April	2,753	2,970	2,970	+ 8%	0%
May	3,101	3,094	3,000	— 3%	—3%
June	2,982	3,338	3,340	+12%	0%
July	3,350	3,555	3,240	— 3%	—9%
August	3,586	3,535	3,680	+ 3%	+4%
September	3,446	3,653	3,330	— 3%	—9%
October	3,918	3,476	3,480	—11%	0%
November	3,559	3,603	3,530	— 1%	—2%
December	4,000	3,858	3,710	— 7%	—4%
Total	38,426	39,628	38,500	0%	—3%

All 1955 and 1956 figures are from the National Office of Vital Statistics. All others are National Safety Council estimates.

Mrs. Howard F. Ilgner

Word has reached ITE headquarters of the death of Mrs. Howard F. Ilgner in Milwaukee on November 27, 1957. She was the widow of Howard F. Ilgner, former member of the Institute, who died February 10, 1955 after a short illness.



new

EAGLE Oversize 12" lens TRAFFIC SIGNAL

CUTS DOWN ON ABRUPT STOPS

This new Eagle traffic signal increases safety in rural areas and on high-speed highways. The lens is 12 inches in diameter instead of the conventional 8 inches. Yet the new signal can be seen from an even greater distance than would be supposed merely by comparing lens areas. For the pattern of the prisms on the new lens is such to provide less dispersion to the sides . . . to send more light in a beam straight down the highway. So motorists see the signal sooner, react sooner. They can brake safely and smoothly . . . and avoid accidents from abrupt stops or running the light.

The new signal is available with prominent 12" *red* lens as illustrated or as a complete signal with 12" lenses in all *three* sections. Arrow lenses are also available. Sections are easily and quickly mounted. Each section is completely enclosed at top and bottom and is joined to other sections with a single nipple and two lock nuts or by two bolts.

FEATURES

- ***Increased light output for greater safety.***
- ***Specially hinged reflector swings away from signal body for easy lamp replacement.***
- ***New type latch holds reflector securely in place — flips open with a slight pull.***
- ***Made of durable weatherproof, rustproof aluminum — weighs only 17¾ lbs.***

EAGLE

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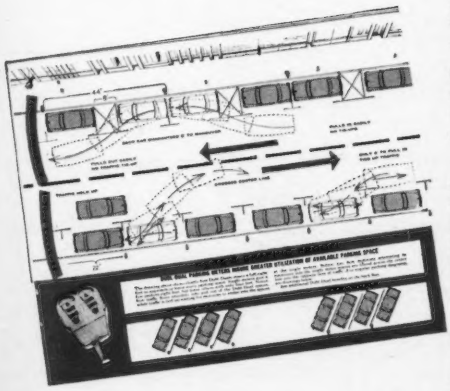

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The nation spent $9,098 million for highway purposes in 1957, according to an estimate of the U. S. Bureau of Public Roads. In a report "Estimate of Highway Receipts and Expenditure, 1955-57" the Bureau estimates that regular Federal-aid expenditure will amount to $1,350 million, some 76 per cent over 1956, and states that this, together with the general increase in receipts and expenditures, "clearly illustrates the expected impact of the 1956 Federal highway legislative enactment."

Capital outlay (construction and acquisition of right-of-way) is expected to account for two-thirds of highway expenditures (exclusive of retirement of obligations) and will total $5,770 million—some $829 million over 1956. Maintenance, administration, highway police and interest show only nominal increases.

A breakdown for the years 1955-57 by function is shown at right: (in millions of dollars).

	1955	1956 Preliminary est.	1957 Forecast
Capital Outlay	$4,323	$4,941	$5,770
Maintenance	1,872	1,970	2,044
Administration	306	335	350
Highway Police	132	147	154
Interest	271	309	318
Total direct expenditures	6,904	7,702	8,636
Obligations Retired	412	423	462
Grand Total	$7,318	$8,125	$9,098

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